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CONCEPTUALIZATION AND INSTRUMENTATION FOR THE COMPARATIVE STUDY OF SECONDARY SCHOOL STRUCTURE AND OPERATION

by

Ⓒ JOHN GRAHAM T. KELSEY

A THESIS

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "Conceptualization and Instrumentation for the Comparative Study of Secondary School Structure and Operation," submitted by John Graham T. Kelsey in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

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ABSTRACT

This study attempted to develop a conceptual framework and instrumentation for the comparative analysis of the administrative and workflow structures of secondary schools.

The study included six stages: (1) the development of a preliminary model of organizational constraints in schools, (2) the adaptation and construction of instruments and their use in a sample of schools drawn from two different environments (Edmonton, Alberta and the West Riding of Yorkshire in England), (3) the analysis of the data to refine the instruments, (4) the assessment of the external validity of the measures, (5) the revision of the preliminary model and (6) its use in a comparison between the schools of the two areas.

Three instruments developed by the Aston group to measure dimensions of organizational structure were adapted for use in schools, and a new instrument was constructed to examine a school's workflow. The refinement of the instruments by tests of internal consistency led to a reduction in the number of items in all instruments and to the identification of two separate sets of items measuring dimensions of workflow diversification. These dimensions were labelled respectively Personalization and Acceptance. Personalization focussed on a way of educating students which encompassed their diverse aspects as persons. Acceptance focussed on an acceptance of their individual tastes and interests and a consequent lack of rigid controls over out-of-classroom activities.

A degree of external validity was established for all measures

with the possible exception of one (Functional Specialization) which appeared to be of less importance in school organizations than in other kinds of organizations. This finding was incorporated into a revision of the preliminary model, together with the findings of the analyses of relationships between variables. The revised model carries several implications for the comparative study of school structures and has some relevance for the comparative study of any organization.

The most important of these implications were that (1) an ecological model can be a valuable tool for comparative analysis, (2) a study of school structures needs to take into account the administrative structure of the local system to which the schools belong since the school's internal structures of administrative control are to a large extent "received" from the local system, (3) comparisons between the structures of organizations of any kind may need to take account of the status of organizational units in terms of their proximity to workflow or production processes. Also of importance was the finding that the measurement of a school's technology or workflow was feasible at the school level as distinct from the classroom level, and that two separate dimensions of workflow structure appear to exist in schools. The use of the revised model in a comparison of schools in Edmonton and the West Riding raised several points of interest in the context of recent developments in both areas.

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Chapter 1

INTRODUCTION

If a comparative study is taken to be one in which comparisons between different groups are made, then there are a great many comparative studies in education. There are, however, two major and distinct meanings of the term. In one usage, the word "comparative" means that comparisons are made between a number of different units--people, schools, school systems--which, however, may be all units belonging to one milieu. In its other usage, the word "comparative" is taken to refer to comparisons between units in different cultures or countries. It is in this second sense that the word is used in the field known as comparative education.

The fields of both comparative education and educational administration have, each in different ways, gained in sophistication in recent years. Students in the latter field have become increasingly aware of the insights afforded by the behavioural sciences (Griffiths, 1964) and, in comparative education, scholars have increasingly insisted on the need for comparative studies to focus on the relationships between observed educational phenomena and their socio-cultural context (Bereday, 1964; Noah and Eckstein, 1969).

What does not yet appear to have occurred, however, is a synthesis of these approaches. Students of educational administration are aware of similarities and differences which exist between systems of education in different countries (Reller and Morphet, 1962), but with few exceptions (Stenhouse, 1969; Taylor, 1969) they have not sought to develop ways of systematically examining them, or of relating them to their socio-cultural contexts. There appears to be, as yet, no cohesive body of work which could be labelled as comparative educational administration.

Whatever may be the reasons for this, it seems plausible to suggest that, while comparative education has become increasingly interested in "macro" concerns, the espousal of the behavioural sciences by students of educational administration has led them initially to a micro analysis of individual schools or school systems. This appears to be particularly true of those studies in educational administration which have focussed on the school as an organization. In their examination of either the structure or the functioning of the school many of these studies have tended to examine one type of school in one type of setting.

In this respect, such studies appear to share the limitation of narrowness of scope for which many organization studies have been criticized (Mouzelis, 1967:174). Organization theory, however, is now rapidly developing a broader comparative perspective, and this development raises the possibility of an analysis of the organizational features of schools in different socio-cultural contexts. The present study attempted to explore this possibility.

The Purpose of the Study

The purpose of the study was to construct measures of the organizational structure and operation of secondary schools, such that comparison of these elements could be made between schools in different cultural contexts.

This required the development of a conceptual framework for such comparative studies and the examination of various ways of conceptualizing and measuring the structure and operation of organizations. This examination led to the decision to do two things: first, to attempt an adaptation to a school setting of two instruments used in the study of other work organizations, and second, to design a new instrument with which to investigate some aspects of a school's operation. A complementary task was the revision of the proposed conceptual model and an examination of its theoretical and practical implications in the area of comparative school studies.

The study was therefore concerned with:

1. The design of a conceptual model for the comparative study of school organizations

2. The adaptation and construction of instruments and their use in a sample of schools drawn from two different socio-cultural settings

3. The analysis of the results in such a way as to:

    a) refine the adapted and constructed instruments

    b) assess the external validity of the measures used

    c) permit the revision of the conceptual model, and

    d) make a comparison between the schools in each of the two settings from which the sample was drawn.

The following section explains the general perspectives in which the purpose of the study may be viewed. Subsequent sections of this introduction will outline the significance of the study, its limitations and delimitations and the organization of the chapters in the thesis.

General Perspectives of the Study

Kaplan (1964:214) writes:

> Too often, we ask how to measure something without raising the question of what we would do with the measurement if we had it. We want to know how without thinking of why.

The purpose of the present study as outlined above is essentially one which relates to a "how" question. In order to understand why such measures should be needed, it is necessary to see the aim of the study in a more general framework of the total school situation.

Present-day formal education takes place very largely in classrooms. In spite of new approaches to both teaching and school architecture, one of the truisms of education remains that what happens in a classroom between a teacher and his students is, in one sense, private. It is a set of interactions bounded by and generated within the walls of the classroom. In another sense, however, what happens in the classroom is the product of several much wider sets of factors. One such set can be considered as virtually boundless, ranging from the amorphous cultural values of the wider social environment in which the classroom is located, to the individual personalities of the teacher and his students. Because of their vast scope and the only vaguely understood complexity of their interrelationships, these factors are extremely difficult to examine directly at the present state of social knowledge.

Another set of factors exists by reason of the fact that while a classroom may be insulated, it is not isolated: it forms part of a school organization. Those who are concerned with the administration of the school organization have the responsibility of facilitating the work of the classroom teacher. However, since they are responsible to higher authorities and to the public for the operation of the total school, they also have the task of co-ordinating the activities of each teacher in the school in such a way as to ensure that the school's operation is a balanced and cohesive whole. Facilitation and co-ordination are not always compatible: a teacher's work can only be facilitated within the limits set by the demands of the whole operation which is being co-ordinated. Thus, the school's organization imposes constraints upon the work of the teacher in the classroom.

These constraints are not simply those imposed by the regulations which control and co-ordinate the work of the school. The very existence of the school organization, in that it provides the framework within which the teacher operates, constitutes a set of constraints. In school X certain things may never be done which, in school Y, are commonly practised. One of the reasons why they are not done may be that regulations exist to prohibit them, but it may also be that the organizational framework of the school makes it difficult for them to be done. Equally, certain actions and procedures may be inconceivable in the context of the work of school Y which are everyday occurrences in school Z, partly because of the different views of the educational process in the two schools.

There are two different kinds of constraint implied here. One may be termed structural, that is, it stems from the organizational structure of the school--its lines of authority, its policies of vertical or horizontal division, the stringency with which the roles of its members are defined. The other may be termed technological in the sense that a technology may be conceived as a way of processing raw materials. To use the word "technology" in this broad sense has not been usual in the writings of educationists. A fuller explanation of the concept and its use is given in Chapters 2 and 3, but for introductory purposes it is sufficient to note that the concept rests on the idea of a school's being a work organization and of its having, like any other work organization, a set of workflow processes which, taken together and considered with the organization's purpose, constitute the technology of the organization.

The argument developed so far--that important constraints on the work of the classroom teacher are exerted by the organization in which he works--may be held, as Blau and Schoenherr (1971:325) point out, to verge on anthropomorphism. Organizations, it may be claimed do not exert influences, organizations do not have a way of processing raw materials; only the people in organizations do these things. If this counter-argument is accepted, there is little point in attempting to analyze or to construct measures of the non-personal elements of organizations--indeed, the very existence of such elements is called into question.

In spite of this common sense approach, organization theorists have continued to examine the organizational elements underlying the behaviour of members of organizations. Their findings indicate that the analysis of interpersonal behaviour is not sufficient to explain the variations found in the characteristics of different organizations or to predict the behaviour of organizational members (Lupton, 1963; Blau and Schoenherr, 1971), and, further, that some very complex relationships operate between variables of organizational structure and the performance of groups within an organization (Pheysey et al., 1971). Blau and Schoenherr (1971:325) forcibly assert not only the existence, but also the importance of the non-personal structures observed in organizations:

> It is worth repeating that these formal structures exhibit regularities that are independent of the individuals in them and that can be studied without enquiring why individual managers make certain decisions. . . . What happens in organizations occurs, of course, only because human beings make decisions and take action. And differences between individuals--their orientations and leadership qualities and other attributes--unquestionably affect the course of events in organizations. Taking these psychological factors into consideration would help explain some differences among organizations . . . but it seems most doubtful that these factors can account for nearly as much of the variance in organizational characteristics as the antecedent organizational conditions do.

The work of these authors, like that of the majority of writers in the area of organizational studies, has not focussed on educational organizations specifically. Most published studies use the terminology of industrial organizations, some of government service organizations; few have been designed specifically in terms of educational organizations, and fewer still have been designed with a specific comparative perspective. As a result, while inferences and analogies can be drawn from many organizational studies and applied to schools, there are only a few measures of a school's organizational structure and none of its technology which are specific to schools[1]. Hence, whatever may be the hypothesized effects of school organizational and technological structures upon the teaching/learning situation, they cannot systematically be tested, nor can they be examined cross-nationally.

The Significance of the Study

The assessment of the effects of school structure upon the teaching/learning situation is beyond the scope of this study. The systematic assessment of these effects appears to be beyond the scope of any study until measures are devised which permit the description of those structural features which may be held to be important. One contribution of the present study was to attempt the construction of measures which have hitherto been lacking in the field of education.

---

[1] The important studies of the bureaucratic structure of schools which, in Canada, stemmed from the work of MacKay (1964), will be discussed in Chapter 2. As will be shown, however, the instrument used in those studies has disadvantages for the kind of analysis envisaged here.

Also of importance is the question of the extent to which organizational studies in general can be considered relevant to the educational setting. Two of the instruments used in the study were adapted directly from instruments used in the empirical examination of a diverse sample of work organizations. The analysis of the applicability of these measures in schools may be of interest to students of educational administration and organization theory.

Finally, as was noted above, educational administration has been slow to develop a comparative perspective. In its development of a framework for comparative studies of school organizations and in the empirical examination of schools in two different socio-cultural settings this study may be held to make a contribution towards filling a gap in the field of educational administration.

The Limitations and Delimitations of the Study

The findings of this study are subject to the following limitations:

1. The accuracy of the information given by respondents in interviews.

2. The accuracy and availability of documentary evidence concerning the schools in the sample.

3. The comparatively small size of the sample studied. The effect of this limitation on the statistical analyses is discussed further in Chapter 4.

This study was restricted to an examination of the size, technology and four structural variables in twenty-one secondary schools located in either Edmonton, Alberta or the West Riding of Yorkshire in England.

The Organization of the Thesis

This chapter has described the purpose of the study, its general orientation, its possible contribution and its limitations and delimitations. Chapter 2 describes the derivation of the study from the field of organization theory, reviews the pertinent literature and discusses some of the limitations of previous approaches to the study of the structure and operation of schools. The design of the study is presented in Chapters 3 and 4. Chapter 3 is concerned with the development of a conceptual framework, the description of the variables, the statement of the problem and the definition of terms, and Chapter 4 deals with the details of the sample and the methods of data collection and analysis. The adaptation and construction of instruments is described in Chapter 5, and Chapter 6 describes their refinement by tests of internal consistency using the data obtained from the use of the instruments in the twenty-one schools of the sample. These tests led to the retention of only some of the items in the instruments and the data pertaining to those items were then used in an examination of the external validity of the measures and the way they discriminated between the schools. This examination is described in Chapter 7, while Chapter 8 presents an analysis of the way the instruments discriminated between schools grouped according to their parent local systems and according to their geographic location. Chapter 9 reintroduces the proposed conceptual model and shows how it may be revised in accordance with the results of the analyses. The chapter also includes a discussion of the theoretical implications of the revised model and an illustrative comparison of the Edmonton and West Riding schools. Chapter 10 concludes the thesis and presents a summary of findings and implications, together with some suggestions for further research in the area.

Chapter 2

THE THEORETICAL BACKGROUND AND RELEVANT LITERATURE

As noted in the introductory chapter, a basic assumption made in this study was that the educational processes which take place in classrooms are subject to organizational constraints. Implicit in this assumption is the further one that a school can be viewed as an organization and treated as a unit of study.

A view of schools as organizations has ample precedents (e.g., Bidwell, 1965; Corwin, 1967; MacKay, 1964; Punch, 1969; Turner, 1969), and although, as Punch (1969:43) has pointed out, many organizational studies in education show little comparability in definitions and concepts used, to consider the school in this way does permit the use of insights gained from the field of organization theory. The purpose of this chapter is to review some of the ways in which organization theorists have studied the structure and other variables of organizations, and to examine in some detail the literature relevant to a study of the structure and operation of school organizations.

APPROACHES TO THE STUDY OF ORGANIZATIONAL STRUCTURE

Recent discussions of organization theory (Child, 1970; Mayntz, 1964; Mouzelis, 1967; Pugh, 1966; Silverman, 1970) make it apparent that there is no one theory of organizations, but that the field is characterized by a multiplicity of approaches. This multiplicity is evident in different ways: in the purposes of study, in the methodology, in the selection of units for study, in the use made of insights gained, in the emphasis given to different variables and concepts. Among all approaches, however, the notion of structure in organizations has been a dominant theme for organizational sociologists since Weber's (1947) introduction of the notion of bureaucracy. To elucidate the concept of organizational structure it is useful to examine its derivation from the concepts of bureaucracy and bureaucratic structure.

Structure and Bureaucracy

When Weber formulated the concept of bureaucracy he was concerned with a historical comparative analysis of changes in accepted authority structures in society rather than with any micro analysis of the structure of any particular organization. His description of the operation of rational-legal or bureaucratic authority and its translation into the realities of organizations, however, has been taken as a description of one kind of regular, patterned arrangements by which organizations may be structured. The well-known characteristics of the ideal type bureaucracy in his formulation have provided a starting point for much writing on organizations.[2] Until recently, there were two main approaches to the study of bureaucracy in organizations. A newer approach has emerged, however, which is grounded in empirical research and which appears to have supplanted earlier research directions.

---

[2] Although the characteristics are well-known, they are not always formulated in the same way by all authors. Twenty-six characteristics can be found in Weber (1947). Punch (1969:45) lists the characteristics treated by different writers who have used the Weberian concept and shows how they differ between writers. The six major elements used by Hall (1961), and on which he based his Organizational Inventory, are: Division of Labour based on functional specializations, Hierarchy of Authority, a System of Rules, a System of Specified Procedures, Impersonality of Interpersonal Relations, and Selection and Promotion based on Technical Competence.

Early approaches. The early approaches to the study of bureaucracy both used Weber's ideal type as a yardstick. In the first case, organizations were examined to see the extent to which they possessed or did not possess Weberian characteristics. The observation that there were discrepancies between the characteristics found in the organizations studied and those of the ideal type led to the postulation of new ideal types. Thus Gouldner (1954) developed the concept of "mock," "punishment centred" and "representative" bureaucracies, Gerth (1952) that of the "charismatic" bureaucracy, and Presthus (1961) that of the "welfare" bureaucracy.

In the second approach, comparisons were made between the observed functioning of organizations and that of the Weberian ideal. These studies pointed to the possible harmful effects of the unintended consequences of bureaucracy and gave rise to the notion of its dysfunctions. It was pointed out, for example, that bureaucratic rules lead to rigidity (Merton, 1952), or reduce performance levels to the minimum acceptable (Gouldner, 1954).

The emphasis in these early approaches on the Weberian ideal type bureaucracy implies two things: first, that bureaucracy is present or absent in an organization (or, in some cases that a modified form of it is), and second, that bureaucracy is a unitary concept and that its characteristics vary together. Both these implications have come to be questioned and the questioning has led first to the realization that organizations may vary in the extent to which they exhibit bureaucratic characteristics (i.e., in the extent to which they are "bureaucratized"), and second, to the empirical demonstration that what was thought of as bureaucracy is not a unitary concept.

Bureaucratization. If the concept of bureaucracy is used to describe individual organizations it is used to refer to their internal structure. Once the attempt is made to differentiate between organizations in these terms it becomes apparent that the differentiation has to be in terms of the extent to which they exhibit bureaucratic characteristics. Organizations, that is, may be more or less bureaucratic.

Punch (1969:44), following Hall (1961), makes this point and notes that it has considerable implications for the empirical comparison of organizations:

> For measurement this implies continuously distributed rather than discontinuous variables. It implies also that the term "bureaucracy" is of less use than the terms "bureaucratic" and "bureaucratization."

From this point of departure Punch's analysis of the variables of bureaucracy leads him to conclude that, although they are distributed continuously, they do not all vary together. In short, he concludes that bureaucracy is not usefully regarded as a unitary concept unless it is defined so as to include only specific elements.

The multi-dimensionality of bureaucracy. Empirical evidence on the multi-dimensional nature of bureaucracy has accumulated since the late 1950's. Udy (1959), working with data from the Human Relations Area Files, suggests that there is not only a lack of correlation between some of the different elements of bureaucracy, but that there is a negative correlation between hierarchical forms and some elements characteristic of a rational, task-oriented organization. Hall (1961) measured six dimensions of bureaucracy and found that, in spite of similarities, they could be considered independent. Further, one of them, technical competence, was negatively related to the others.

These studies referred to the bureaucratic structure of the organizations examined. It is, however, possible to question whether all of the characteristics of Weber's ideal type are structural characteristics. Heady (1959) points out that they can be considered as falling into three categories: structural, behavioural and purposive. Pugh et al. (1968) have shown that an examination of the purely structural elements in a diverse sample of work organizations yields two main and two subsidiary dimensions of organizational structure.

These studies by Pugh and his colleagues have come to be known as the "Aston studies" because of their authors' association with the University of Aston in England. They not only demonstrate the multidimensionality of organizational structure, but they also mark the distance travelled in the study of organizations from the early unitary concept of bureaucracy as an ideal type to the more complex concept of different and independent variables of organizational structure.[3]

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[3] In a recent replication of the original Aston studies, Child (1972) has obtained results which lead him to question the independence of the two major variables of organizational structure found in the Aston sample. Some of the findings of the present study were relevant to Child's argument and the question will be raised in Chapter 9. Although Child's argument casts some doubt on one aspect of the Aston interpretation of bureaucracy, it does not invalidate the point made above, that the Aston studies have demonstrated the existence of several dimensions of organizational structure.

The Aston Approach

The purpose of the total research design on which the Aston studies are based is to attempt to probe a difficult and unsolved problem in the field of organization studies: the relationship between organizational structure and personal behaviour (at group and individual levels) in organizations. As Pugh et al. (1963:292) note:

> . . . We are concerned with the attempt to generalize and develop the study of work organization and behaviour into a consideration of the interdependence of three conceptually distinct levels of analysis of behaviour in organizations: (1) organizational structure and functioning, (2) group composition and interaction, and (3) individual personality and behaviour.

These authors also point out that since the first of these levels must exist in relation to other aspects of organization (the organizational context of structure), it is necessary, in addition, to examine contextual variables.

The examination of such a complex set of interrelationships must proceed by stages, and hitherto, the Aston researchers have developed most fully the investigation into the first of these conceptual levels--organizational structure and functioning--and its associated contextual variables. The results of the first of their studies have been published in two papers (Pugh et al., 1968; 1969) which deal respectively with structural and contextual variables. In the present review a discussion of the contextual aspect of their research will be dealt with separately (see below, pp. 18-20) and the following paragraphs will describe their major findings concerning the structure of organizations.

Taking Weber as the founder of the sociological study of organizations, the Aston researchers first isolate the conceptually distinct elements in his formulation of bureaucracy (Pugh et al., 1963:293-299).

Following Heady (1959) they distinguish between structural and behavioural elements and conceptualize six dimensions of organizational structure, all of which they regard as variables. The six are: specialization, standardization, formalization, centralization, configuration and flexibility.

Before these six dimensions can be measured they need to be operationally defined, and the Aston researchers point out (Pugh et al., 1963:299-300) that an organization's structure cannot be defined except in relation to its functioning. To enable them to conceptualize this relationship they draw upon Bakke's (1950; 1959) description of the processes of work organizations (identification, perpetuation, workflow, control and homeostatic processes). They attempt to measure each structural dimension in terms of the process to which it is directed.

The results of this attempt (which was carried out with a sample of fifty-two work organizations) are reported in Pugh et al. (1968) together with appendices giving full details of the scales by which five of the variables were measured. (The sixth, flexibility, was dropped because its measurement required diachronic data which were not available.) Each of the variables proved to be measurable and it was possible to construct profiles to represent the structural characteristics of each of the organizations in the sample. When factor analysis was used to examine the relationships among the scales, it was found that four independent factors emerged which the researchers labelled structuring of activities, concentration of authority, line control of workflow and size of supportive component.

After the successful completion of the first studies an attempt was made to improve the feasibility of carrying out further studies by abbreviating the very long interview schedule which had been used for data collection. Inkson et al. (1970a) report the successful development of a short form of the schedule to examine the major dimensions of structure and context found in the earlier studies. This abbreviated form uses the two major factors of structure (structuring of activities and concentration of authority) as key variables in the description of organizational structure, and the replication study demonstrated that the short form measures obtained were both valid and reliable. Subsequent studies using the short form have been reported by Inkson et al. (1970b), McMillan et al. (1970), Hinings and Lee (1971), and Hickson et al. (1971). Two Alberta studies (Newberry, 1971; Heron, 1972) have used a modified version of the short form instrument to examine college structures in Alberta and British Columbia.

THE CONTEXT OF ORGANIZATIONAL STRUCTURE

Context and Environment

The term "context" as used here is to be distinguished from the term "environment." The environment of an organization is the total milieu--economic, physical, geographic, social and cultural--in which it is located and which it serves. To identify, define and measure important variables in an organization's environment is a formidable task. It is perhaps because of this that those studies which have dealt at all with the environment of organizations have usually restricted themselves to a consideration of such relatively easily measurable items as the size and extent of a firm's market and sources of supply (Lawrence and Lorsch, 1969), or technical changes in the industry which it represents (Emery and Trist, 1965).

The context of an organization--or, perhaps, more properly, since the usage follows that of the Aston studies, the context of an organization's structure--is a much narrower concept. Child (1970:381-2) gives a clear definition of context in relation to environment:

> The components of [an organization's] operating situation can be identified at two levels. First, the environment within which the organization as a whole functions--its product and supply markets, the field of relevant technical knowledge, its political and socio-cultural environments. Secondly, there is the immediate organizational context within which operations take place. . . . Elements of this context include the organization's size, its operating and information technologies, policies, history, patterns of ownership and control, and the type of employees it has.

The use of the word "contextual" to describe such variables as those noted by Child appears to have originated with the Aston researchers (Pugh et al., 1963:293) and in a later paper they specify their meaning (Pugh et al., 1969:91):

> It [the conceptual framework of the Aston studies] is not a model of organization in an environment, but a separation of variables of structure and of organizational performance from other variables commonly hypothesized to be related to them, which are called "contextual" in the sense that they can be regarded as a setting within which structure is developed.

The Aston Contextual Variables

The Aston researchers identified those aspects of context which had been considered important by other writers in the field of organization studies, operationalized them, and constructed scales to measure them. Seven variables were used in the study (Pugh et al., 1969): origin and history, ownership and control, size, charter, technology, location (defined as the number of operating sites), and dependence on other organizations. Again, each of these variables proved to be measurable by the Aston scales.

An analysis of the relationships between these variables and the previously determined variables of organizational structure showed statistically significant relationships. Of greater interest were the results of the multi-variate analysis which attempted to assign some priorities among the contextual variables in respect of the extent to which they were predictors of structure. The indications were quite clear (1969:110) that:

> . . . size, technology, dependence and location are critical in the prediction of the two major dimensions (structuring of activities, concentration of authority) of the structures of work organizations.

In a later paper Hickson et al. (1969) used this finding to attack the question of "technological determinism"--the view that technology is all-important in determining the structure of organizations. Their concluding hypothesis that "variables of operations technology will be related only to those structural variables that are centred on the workflow," and the further suggestion that this will be most strongly observed in smaller organizations, are of interest to those concerned with organizations which, like schools, are largely workflow-centred and which normally have fewer than one hundred employees.

In that the paper clearly refuted the claim that technology is the universally important determinant of organizational structure, it led to some controversy (Osmond, 1970; Aldrich, 1972). Some of the agruments in this controversy referred to the definition of technology used by the Aston group. Since a consideration of their definition is important in any attempt to apply the concept of technology to different kinds of organizations, this review will consider the whole question of the concept in some detail.

THE TECHNOLOGY OF ORGANIZATIONS

In the Aston studies the workflow processes of an organization (that is, the direct production in which it is engaged) are held to be analytically distinct from other processes in the organization. It is in the workflow that an organization's technology is used. Technology, even that applied in workflows of a similar nature, may differ from organization to organization, and it is usefully thought of as an important variable of the context in which an organization's structure operates (Thompson and Bates, 1957; Thompson, 1967). Some, notably Woodward (1958; 1965), have held it to be a uniquely important determinant of structure.

The Definition of Technology

No universally accepted definition of technology exists. Hickson et al. (1969:380) state categorically that "conceptualization of an organization's technology is still at a stage where the word technology may have varying meanings." One of the meanings which is rarely, if ever, met with in the writings of organization theorists is that of technology as a synonym for mechanical, electrical or electronic machines used in carrying out a job. This restricted meaning is frequently seen in educational literature, when it usually introduces a discussion of the use of computers or machines as teaching aids. Alone, this concept of technology is too narrow to be useful in the analysis of work organizations in general and, even in the analysis of specific kinds of work organizations, it ignores any consideration of non-mechanical techniques.

An examination of some of the definitions of technology used in organization studies shows that they rest on considerably broader concepts. Thus Thompson and Bates (1957:325) define it as "those sets of man-machine activities which together produce a desired good or service," and Pugh et al. (1963:310) as "the techniques that [an organization] uses in its workflow activities." Thompson's (1967:15-19) three kinds of technology include the notions of interdependence of parts of the workflow, the standardization of operations and consideration of the raw material which is being processed. For Perrow (1967:195) technology is "the actions that an individual performs upon an object . . . in order to make some change in that object."

Technology in the Aston Studies

In their analysis of the concept of technology the Aston researchers attempt to synthesize the various definitions of the term by isolating three distinct facets of the ways in which it has been used (Hickson et al., 1969:380). These facets they label respectively "operations technology," "materials technology" and "knowledge technology."

"Operations technology" is defined, following Pugh et al. (1963: 310) as the techniques used in the workflow activities and it refers to the way in which workflow activities are equipped and sequenced. "Materials technology" is a concept which includes the characteristics not only of the equipment used to process the raw material, but also of the raw material itself. "Knowledge technology," closely linked with "materials technology," is a concept which takes into account the extent to which the raw material is "known" or understood and, therefore, the extent to which logical analysis of the problems encountered in working with it can be achieved.

Although the Aston findings deny to technology a unique importance as a predictor of organizational structure, they nevertheless show it to be an important contextual variable. In two respects, however, their findings need to be examined more closely. The first concerns the definition of technology used, and the second the way in which their measurement of technology distinguished between the organizations in the Aston sample.

The Aston work rests upon the first of the technology concepts noted above, namely, "operations technology." The composite measure by which the technology variable was scored is known as "workflow integration" and includes measures of the degree of automation used in the workflow, the rigidity of the workflow, the interdependence of segments of the workflow and the specificity of the evaluation of operations. It is, therefore, specifically and by design restricted to a consideration of the equipping and sequencing of operations.

As a measure the composite scale of workflow integration does distinguish between the organizations in the Aston sample, but the most obvious feature of the distinction is the way it separates service from manufacturing organizations. A high score appears generally to characterize manufacturing organizations and a low score service organizations (Hickson et al., 1969: Table 7). Which is to say that service organizations are not generally equipped with much automated or fixed equipment and that the segments of their workflows are not such that the processes in one stage are highly dependent on the processes in another stage; nor can their operations be evaluated with a high degree of specificity.

Experience suggests that differences between the technologies of organizations of any given type (e.g., service organizations) exist to a greater degree than is measured by the Aston scales of workflow integration. The Aston researchers recognize that their scales may not be fully adequate (Hickson et al., 1969:384), but, although they suggest additional technology variables which might be studied, they do not appear to include any which go beyond the concepts of equipping and sequencing the workflow. Given the set of Aston contextual variables, it is difficult to see how their concept of technology could be broadened without impinging on what they include in other variables.

Technology: A Broader Conceptualization

As has been noted above, broader conceptualizations of technology may include not only the actions performed upon the raw material, but also a consideration of the raw material itself and also of the knowledge of it possessed by those who work with it. One of the broadest conceptualizations is that put forward by Perrow (1967; 1970). His approach does not appear to have been widely operationalized, but it is a convincing conceptualization, particularly in the case of service organizations whose raw material is often more variable than that of some manufacturing industries. Perrow focusses on those facets of technology which were labelled above as "materials technology" and "knowledge technology." In examining his approach, it is difficult to make the same clear distinction between the two as the Aston researchers do, since the way the raw material is understood and knowledge of how to deal with its problems are both functions of its perceived characteristics.

Perrow's approach.

Technology is defined by Perrow (1967:195) as "the actions that an individual performs upon an object . . . in order to make some change in that object." The "object" is the raw material with which an organization works, and its definition is wide--for example (1967:195):

> People are raw materials in people-changing or people-processing organizations; symbols are materials in banks, advertizing organizations and some research organizations. . . .

According to Perrow, the kind of technology determines the type of organization which will be set up to operate it and, in turn, the raw materials determine what kind of technology will be used. The first of these arguments is, as noted above, questioned by the Aston multivariate approach. The second is less simple than its brief statement makes it appear. A fuller examination of what it means gives useful insights into the broader conceptualization of technology.

Raw materials and technology. Before any raw material can be processed it must be analyzed by the would-be processor and Perrow's point here (1967:196-7) is that "the state of the art of analyzing the characteristics of the raw materials is likely to determine what kind of technology will be used."

By the characteristics of the raw material, Perrow is not referring to any essential properties of the material itself, but to the ways in which it is perceived. Two characteristics of the raw material as perceived by those who process it are important: first its understandability (since the more it is understood, the more it can be controlled), and second, its stability and variability (which determine whether it can be handled in a standardized fashion or whether continual adjustments to the process are necessary).

To consider these two characteristics together is to be able to envisage a spectrum in which, at one extreme, the raw material is perceived to be very understandable and uniform and stable. At the opposite extreme, the material is perceived as poorly understood and highly non-uniform. If a raw material is perceived as well-understood and stable and uniform, few exceptional cases are likely to be encountered in processing it. If the opposite is the case, the processing is likely to yield a higher number of exceptional cases.

When exceptions occur, argues Perrow, a search process must be undertaken to determine what action is to be taken. The search process may be one which is logical and analytical, or it may be the search for an answer to a problem which is so vague and poorly conceptualized as to make it virtually unanalyzable. In cases where few exceptions arise which are, in any case, subject to logical, analytical search processes, a routine technology is likely to emerge. On the other hand, a non-routine technology is needed to handle raw materials which present many problems of an unanalyzable nature.

An illustration of Perrow's case. Perrow illustrates his case by contrasting two institutions for delinquents (1970:28-37) which had been the subject of an earlier study. In the one, "Inland," a delinquent was perceived as someone who had been let down by adults and who needed individual psychiatric help, guidance and sympathy. In the other, "Dick," the delinquent was perceived as one lacking in respect for, and obedience to adults. Whereas the work at "Dick" could be, and was, routine (since all delinquents were viewed as uniformly in need of obedience training), the work at "Inland" more closely resembled a psychiatric clinic in which each delinquent was a unique problem and routine procedures were inappropriate.

In his discussion of the two institutions, Perrow uses his concept of technology as an explanatory tool. He has not operationalized the concept, and it cannot be said that he has used it to conduct an empirical examination of "Dick" and "Inland." In this respect, the concept is of less practical use than the operationalized definition used in the Aston studies. In other respects, however, Perrow's conceptualization is stimulating for students of non-manufacturing organizations. The example cited above, taken from the area of "people-processing" organizations, gives an indication of the potential value of Perrow's conceptualization in the study of schools.

THE STRUCTURE AND CONTEXT OF SCHOOL ORGANIZATIONS

The contribution of organization theory to the study of educational organizations is difficult to assess. Rhea (1963) claimed that models developed to describe "product-processing" organizations are not adequate to describe "people-processing" organizations, whereas others believe that increasingly sophisticated approaches to educational administration have not considered enough the organizational aspects of the school (Carver and Sergiovanni, 1969:ix). Still others find organization theory the source of powerful insights into the operation of school organizations (Davies, 1970; Musgrove, 1971). Although the use of insights from organization theory is of considerable value in interpreting or discussing events and situations in an educational setting, it can often be no more than the drawing of more or less powerful analogies. Unless an attempt has been made to test empirically the extent to which the findings of, for example, industrial studies are paralleled in school organizations, the true applicability of such findings cannot be known. The following paragraphs will examine more closely some of the ways in which the structural and contextual variables discussed above have been studied in school organizations.

The Structure of School Organizations

In 1968 Katz (1968:423) noted that little was known about structure in school organizations. Writing one year later, Robbins and Miller (1969:47) stated that ". . . the concept school structure is not validated by either empirical or theoretical analysis," and they also referred to "the paucity of adequate theoretical development in support of the concept." In spite of these claims, several attempts have been made either to use the concept or to identify and measure structural variables in schools. Viewed together, these attempts can be classed in two groups: those which use an explanatory or exploratory approach and which define whatever structural variables are best suited to the author's purpose, and second, those which focus on and attempt increasingly to refine the notion of bureaucratic structure in schools.

Explanatory and exploratory approaches.

Under the general heading of explanatory studies may be grouped those which use concepts developed in the general field of organization theory to attempt an analysis or an explanation of the school. These studies rely on logic and insight rather than on the collection of empirical data. Some of the writings in this category are general and all-embracing, as found, for example, in Bidwell (1965) or Corwin (1967), each of whom discusses the whole question of the school as a formal or complex organization, and shows how concepts of structure developed in organization theory may be used to guide the development of research into school organizations or the development of typologies for comparative analysis of schools with other organizations. Other studies focus on a particular aspect of organization theory and explore its relevance to schools in some detail. Thus Abbott (1965) discusses the hierarchical structure of schools in terms of its being an impediment to change, and Friesen (1967) uses Etzioni's (1964) classification of organizational control structures as a background for the explanation of student behaviour. Musgrove (1971), analyzing the English education systems, uses previous work on the concepts of power and authority structures.

To the extent that these studies perceptively relate the findings of organization theory to educational organizations they are the source of useful insights into the analysis of school structure and operation or behaviour. They do not, however, attempt the empirical exploration of whatever elements of organizational structure may be found in schools.

Such exploration is found in several studies over the last five years. The findings of these studies, seen together, are inconclusive, and one reason for this appears to be that their operational definitions of school structure vary widely. For Adams et al. (1970) "structure" refers to the level of the school--elementary, junior or senior high; for Brunetti (1970) it refers to the open space/self contained classroom dichotomy; and for Carpenter (1971) it is the flat, medium or tall "shape" of the organization. The structure of schools has been variously measured by the Index of Relatively Open and Closed Schools (Coughlan, 1970), and a Functional Substructure Coordination instrument (Hersom, 1969). One group of studies exists, however, in which a more consistent approach to the measurement of structure is used. These studies are those which examine the bureaucratic structure of schools.

The bureaucratic structure of schools. The studies which focus on the bureaucratic dimensions of school structure all base their measurement on the same instrument, Hall's (1961) Organizational Inventory. All the studies use one of two adaptations of the instrument which make it more suitable for use in schools, that by MacKay (1964) or that by Punch (1967).

The Organizational Inventory measures six dimensions of bureaucracy, drawn from a thorough analysis of the literature on the subject (Hall, 1961:7). The six dimensions are: (1) Hierarchy of Authority, (2) Division of Labour, (3) Rules for Incumbents, (4) Procedural Specifications, (5) Impersonality, (6) Technical Competency. The instrument measures the extent to which each of them is present in an organization by asking members to rate a series of statements about their organization on a five-point scale ranging from "Definitely true" to "Definitely false."

The purpose of the school studies using the Organizational Inventory has usually been to examine school bureaucratic structures in relation to some behavioural or personality variable--professionalism (Robinson, 1966), student alienation (Kolesar, 1967; B. Anderson, 1970), communication (Mansfield, 1967), teacher personality needs and satisfaction (Gosine, 1970), leader behaviour (Punch, 1967). The use of this design in so many studies seems to imply that the concept of structure based on the bureaucratic model is a valid yardstick of organizational structure against which any of the other variables may be examined. That such is not the case may be seen from an inspection of the way these studies treat the concept of bureaucratic structure.

The original study by MacKay (1964) and the studies by Robinson, Kolesar and Punch used all six dimensions of the Organizational Inventory. In all these studies it was shown that the six dimensions did not constitute a homogeneous variable which could be called bureaucracy. MacKay's analysis led him to regard three dimensions (Hierarchy, Rules, Procedural Specification) as the most characteristic of a bureaucratic organization, and one (Technical Competence) as an "abureaucratic" dimension. Robinson was able to make a similar distinction. Kolesar, too, found two distinct dimensions and labelled them "authority" and "expertise." Punch refined the instrument further and, having used factor analysis, was able to state categorically (1969:53):

> Bureaucratic structure in schools is realistically conceptualized as a unitary homogeneous variable only if restricted to the dimensions of hierarchy of authority, rules for incumbents, procedural specifications and impersonality.

Gosine used Punch's finding and defined bureaucracy only in terms of these four dimensions. Other studies, however, have used different emphases. B. Anderson found two factors which he labelled "Status-Maintenance" and "Behaviour Control," and this finding probably reflects his addition of a seventh (control) dimension to the six measured by the Organizational Inventory. Mansfield regarded bureaucracy as a unitary concept, but took pedagogical rules as its critical determinant, an approach used also in an American study by J.G. Anderson (1968).

In a paper which examines some of the above studies in terms of their successive contributions to a refinement of the notion of bureaucratic structure, MacKay (1969) sees each of the Alberta studies as a "tactical response" to the findings of the previous ones. Overall, the studies do show an increasingly clear delineation of those dimensions of the Organizational Inventory which cluster together. But what is less clear is whether they increasingly refine the concept of organizational structure in schools. MacKay's original study, for example, concluded (1964:167) that the bureaucratic model was not generally descriptive of the schools in his sample, and the attempts noted above by others to label different factors, to stress one dimension over others, or to add a further dimension may perhaps be seen as a tacit acknowledgement of the limitations of the model.

"Contextual" Variables in School Organizations

Of the seven variables identified as contextual in the Aston studies (see above, pp. 18-20) only one, Size, has been much discussed in educational studies derived from organization theory. There are probably two main reasons for this: first, the Aston conceptualization of such variables as both contextual and analytically distinct is relatively new, and second, the variables themselves may not be particularly appropriate for the study of schools as organizations. This second reason deserves some examination, particularly since the Aston conceptualization purports to be applicable to all work organizations.

The Aston researchers selected their contextual variables ". . . not from a common conceptual base, but for their postulated links with structure" (Pugh et al., 1969:93), and these links were postulated after a study of the literature on organizations, most of which were non-educational. The Aston sample (Pugh et al., 1968:Table 1) did include an educational organization, but before this fact can be accepted as an indication of the applicability of the Aston variables to school organizations two points need to be considered: first, the educational organization in the sample was a local education authority and not a school, and second, the purpose of the Aston sampling was to provide a diverse sample of work organizations so that different kinds of organization could be compared.

Given such a purpose it is appropriate to consider the extent to which a local education authority manifests differences from other types of organization in origin and history, ownership and control, size, charter, technology, location and dependence. However, not only may it be inappropriate to consider these variables in a sample of schools, it may also be unimportant if the purpose of considering them is to make a comparison between schools rather than between schools and manufacturing plants or retail organizations or bank branches. Thus the variables of origin and history, ownership and control, location (defined as the number of operating sites) and dependence (on other organizations) might well be disregarded in an examination of publicly financed schools in most western countries since they typically belong to parent organizations (school systems) which originated under similar circumstances during a fairly short time span, and are controlled by elected representatives and their appointed executive staffs. Schools also typically have one operating site and are dependent on other organizations to a similar extent.

The variables of charter (or purpose and ideology and value system) and technology, as they are measured in the Aston studies, do not seem applicable to a study of school organizations. Largely this is again because the aim in the Aston studies was to compare different kinds of organization, and the component scales of these variables--measuring such items as multiplicity of outputs, client selection, range of automation--could not be expected to distinguish between different schools. However, both variables are capable of broader definition (and, in some respects, of overlapping areas of focus) which might make them, or a combination of them, valuable in the comparison of different schools. The work on the "charter" of educational organizations has been conducted in the framework of educational history and philosophy rather than in the context of applied organization theory. Discussion of technology in schools has been traditionally concerned with the use of machines in the classroom and, although Charters (1964) uses a broad concept of technology as ways of transforming raw materials (students) in schools, it is only recently that other writings have appeared which use the term in a broader conceptualization in relation to classroom practice (Dreeben, 1970; Nickson, 1971). Neither variable appears to have been discussed as bearing directly on an analysis of the variables involved in the operation of the school as an organization.

The variable of size in organizations has been given attention in many studies. In non-educational organizations the recent analysis by Blau and Schoenherr (1971) concludes with an attempt to build a theory of organizational structure and bases its propositions on the generalization that (1971:301) "Increasing size generates structural differentiation in organizations along various dimensions at decelerating rates." The relationship between size and structural variables in any kind of organization is not a simple one. MacKay's (1964) study found that, in schools, size was correlated with only three of the bureaucratic dimensions (Hierarchy, Rules for Incumbents and Procedural Specification), and Punch (1967) found an unexpected negative relationship between size and bureaucracy as measured by the four dimensions of Hierarchy, Rules, Procedural Specification and Impersonality. Neither of these studies reported a correlation between size and the division of labour in school organizations, although such a correlation might be expected (Blau and Schoenherr, 1971), and this lack may reflect the way in which division of labour is measured by the Organizational Inventory as adapted by MacKay and Punch.

A different way of examining the effects of size on the structure of schools is to examine its effect on their administrative ratios. Such an approach relates more to the Aston variables of configuration than it does to the general bureaucracy measures of the MacKay and Punch studies. A series of studies using this focus has been carried out under the direction of Holdaway (Holdaway, 1971; 1972; Holdaway and Blowers, 1971). Most of the studies have examined the relationships between the size and administrative ratios of school systems, but one study has analyzed these relationships at the school level (Gregory, 1972). This study found that, in general, larger schools tended to have smaller percentages of staff time allotted to administrative, clerical and support staff components, but that senior high schools had a higher percentage of these components than did the elementary or junior high schools.

LIMITATIONS OF SCHOOL ORGANIZATION STUDIES FOR COMPARATIVE RESEARCH

Most of the work on schools reviewed above may be seen as a response (whether intentional or not) to Bidwell's (1965) plea for more studies of the actual functioning of schools, and yet, as recently as

1971, one commentator felt justified in claiming that too little is still known about the subject (Sarason, 1971:229).

The studies of the last seven or eight years which have analyzed the organizational features of schools have clarified the notion of bureaucratic structure in schools, they have shown an increasing refinement of statistical techniques, and they have revealed some relationships which seem to be regular and important. They have not, however, provided a wholly acceptable tool for the comparative analysis of schools as organizations which will enable future research to focus on universally agreed dimensions of school structure in order to explore their relationships with the many aspects of the teaching-learning situation or to understand their operation with a view to the successful implementation of change in schools.[4]

Part of the reason for the non-use of these studies in wider comparative studies may lie in the apparent reluctance of researchers to carry out replication studies, but other reasons may lie in perceived inadequacies in the previous studies themselves. Four such inadequacies are outlined here. Broadly speaking, two may be classified as methodological, and two as conceptual.

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4. This latter point is a key issue with Sarason. He writes (1971:229):

> . . . our past efforts to change and improve our schools have been less than successful in part because we thought we knew what we needed to know about the actual functioning of these complex organizations. In short, the problem has resided not only "out there" in the schools, but in the ways in which we have been accustomed to thinking about what it was that needed to be changed, and these ways of thinking prevented us from recognizing what we did not know but needed to know. (emphasis in the original)

Methodological Considerations

A consideration of the types of schools which made up the samples in the studies reviewed raises questions about the value of the instruments for examining different samples. A consideration of the kinds of data used raises questions about the validity of the measurement of some concepts of school structure.

The nature of the samples used. In any given study, the sample used may be considered suitable for the purposes of the study itself. When the studies are considered together, however, two things become noticeable. First, samples have most frequently been drawn from one geographical area and in some cases, from one jurisdiction. Second, high schools have been examined less frequently than have elementary or junior high schools.

The advantage in research focussing on the schools of any one area is that many environmental factors may be assumed to be constant, and this assumption is made explicit by Hersom (1969:109). For broader comparative purposes, however, such research has the disadvantage that it can offer no insights into the possible effect of environmental factors on the structure or operation of the schools studied. Thus it is possible that Hersom's finding of a clear distinction between elementary and secondary schools in terms of the resource acquisition behaviour and structural characteristics measured by her instruments (1969:112-4) may not hold in an environment in which the delegation of decision-making to schools from a central authority is more or less extensive than that in her Manitoba sample.

A focus on one kind of school at the expense of another also carries disadvantages. The studies of bureaucracy in schools have in general used samples of elementary or junior high schools. MacKay's (1964) conclusion that the bureaucratic model was not generally descriptive of the schools in his sample has not prevented subsequent studies from continuing to use the Organizational Inventory and, moreover, Punch (1967:82) claims that its use is more suited to elementary than secondary schools. This claim is based on the fact that teacher scores for each of the dimensions of bureaucracy are summed and averaged for each school in order to give a measure of the dimensions in the whole of that school, and that this procedure is less meaningful where, as in high schools, there may be marked interdepartmental variation within the school.

There are, then, indications both that elementary and junior high schools are not best described in terms of the bureaucratic dimensions of the Organizational Inventory, and also, that the method of using the inventory makes it less suitable for high schools. The conclusion that it is therefore suitable for neither kind of school is perhaps too sweeping, but does point to the possibility that, as a general measure of school structure, it may have limitations not fully shown by studies which have neglected the analysis of high schools.

The nature of the data. The Organizational Inventory consists of a series of statements to which teachers respond by indicating on a five-point scale the extent to which they agree or disagree that each statement describes the situation in their school. Hersom's Functional Substructure Coordination Questionnaire and her Resource Acquisition-Distribution Questionnaire similarly ask for teacher perceptions of school structure and behaviour.

In support of this kind of data, it can be argued that the "reality" of a school is that which is perceived by its members actually to happen, rather than that which is supposed to happen according to some administrative plan. Individual perceptions, however, may be distorted, and the method of averaging scores of individuals to obtain a score for one school, while it may reduce the effect of some distortions, may increase others--as, for example, in the case where a large segment of the staff may feel antipathy to some aspect of the school: the antipathy may be an aspect of the "reality" of the school, the reflection which it gives of the school's structure may not be.

A possible source of such distortion is shown by Punch (1967: 118 et seq.) when he seeks to account for his finding of a significant and unexpected negative relationship between school size and bureaucracy. He argues that the perceptions of staff in small schools may lead them to report even a relatively low degree of bureaucracy as "high bureaucracy" because their expectations of what constitutes bureaucratic administration may be different from the expectations of staff working in large schools.

Further, it may be argued that an individual's perceptions are to a large extent conditioned by the wider socio-cultural environment to which he belongs. If this is the case, studies based on perceptual data are likely to be less suitable for broad comparative studies than are those based on more "objective" data such as the numbers of elements of a particular structural feature to be found in a school.

Conceptual Considerations

The way in which school organization variables have been conceptualized in previous studies raises questions about the suitability of these variables for comparative analysis, and about the boundaries between structural and contextual variables. It will be useful to consider previous studies first in terms of the models they present for comparative analysis and second, in terms of the concepts on which their variables are based.

Comparative models. In the study of comparative public administration Riggs (1962a) saw three desirable trends: (1) a change from normative to empirical studies, (2) an increasing emphasis on nomothetic (theory building) as opposed to idiographic (case study) methods, and (3) a change from non-ecological to ecological studies. He noted examples of the first two changes but saw only small evidence of the third. He concluded (1962a:14) that:

> The comparative study of public administration . . . will remain relatively sterile and limited in its significance unless, and until it learns how to change from a predominantly non-ecological to an ecological method.

An ecological model is one which seeks to take account of the "ecology" of the administrative phenomena under study--to relate them to the environment in which they occur. Riggs' point, made with reference to public administration, could equally be made of studies in educational administration. Those studies which have used the bureaucratic model as a basis for the analysis of school organizations focus on the interna of the organization and are not, in general, concerned with the extra-organizational setting of the schools studied.

Hersom's (1969) study is one which does not use the bureaucratic model and which explicitly sets out to consider the school in its environment. However, in its focus on the resource acquisition behaviour of schools, it treats the environment solely as a source of inputs to the organization. The emphasis, then, is not on the way the environment affects the structure of schools, but rather on the way in which the school is structured to receive given resources from an environment in which, it is assumed, resources are equally available but not always acquired. In this sense, Hersom's study, too, lacks the kind of focus which enables structure to be considered in the context of different environments, and hence may not provide a useful tool in wider comparative analysis.

Structure and context. In their argument that the concept of school structure is of doubtful validity Robbins and Miller (1969) make the point that the term "structure" is difficult to define. Their own definition of structure as "organizational arrangements" is a broad one--too broad, it may be argued, to be meaningful as an aid to empirical research. An examination of other studies of school structure, however, reveals that the definitions of structure used in them are almost as broad as that used by Robbins and Miller. MacKay (1964:57) refers to structure as "patterned arrangements" and Hersom (1969:35) as "regular patterns of activities developed within a school to facilitate the achievement of its aims."

It is possible that, as one element of a school organization, structure cannot meaningfully be defined in such broad terms, since a school, like any other organization, exhibits several structures--for example, an administrative structure, a workflow structure, an informal structure of relationships between people, or a curriculum structure. To distinguish between structures is not easy but, following the lead of the Aston approach, it is at least possible to distinguish between an administrative structure and the structure of the workflow of a school organization.

One of the weaknesses of the Organizational Inventory is that, using a broad definition of structure, it does not distinguish between these two kinds of structure. In any one of the versions of the instrument workflow elements are mingled with more particularly administrative elements. Thus in MacKay's instrument, Dimension II (Division of Labour) has only one question which does not refer to a workflow process, whereas all items in Dimension VI (Technical Competence) refer to non-workflow activities, and the items in the remaining dimensions are a mixture of non-workflow and workflow items. In Punch's instrument a different but equally mixed representation of the two kinds of activity is apparent.

Summary: the Limitations and Their Implications

Both the views of some commentators and a critical examination of some aspects of previous studies of school organizations indicate that the means for wide comparative analysis of the organizational features of schools are not as yet fully adequate. Some of the inadequacies of previous approaches lie in both methodological and conceptual areas.

The examination of these previous approaches indicates that some of their limitations might be overcome by studies which used non-perceptual data from a sample of schools which is not restricted to one geographical or jurisdictional area. They should also be based on a conceptual scheme which, while taking ecological factors into account, enables a more precise formulation of distinctive elements of structure and context in school organizations.

Chapter 3

THE CONCEPTUAL FRAMEWORK, THE PROBLEM AND THE DEFINITION OF TERMS

This study attempted to meet as far as possible the requirements for a comparative analysis of school organizations which, in the previous chapter, were derived from a critical examination of some existing studies of the organizational features of schools. Descriptions of the kind of data used and the sample investigated are located in Chapter 4. This chapter deals with the conceptual model for the study and its component variables, the statement of the problem and the definition of terms.

THE GENERAL MODEL AND ITS ASSUMPTIONS

The conceptual framework within which the study was cast is conveniently illustrated in the form of two diagrams. Figure 1 shows a proposed general model of non-personal organizational variables in their environment which may impinge upon the processes taking place in any given classroom. Figure 2 (p. 58) shows an expanded version of some of these variables. In both figures the lines connecting the variables indicate postulated relationships which, if found to exist in any given sample of schools, may serve as a partial validation of the conceptualization and measurement of those variables. Since the figures illustrate a general model, they include lines to represent postulated relationships which could not all be tested within the limits of a single study. Those relationships which were investigated in the present study are specified in the statement of the problem (see below, pp. 59-61), and resultant revisions in the model are presented in Chapter 9. The general model and the assumptions underlying it are presented in the following sections. A more detailed explanation of its component variables follows the statement of these assumptions and refers more explicitly to Figure 2.

The General Model

The proposed general model of organizational constraints on classroom processes illustrated in Figure 1 incorporates seven major dimensions. The geographic location of the school will determine in which socio-cultural and economic environment the school functions. Within that environment the school will belong to a given parent organization, the local school system, and it will be of a certain type and size. Within the school itself, both the administrative structure of the organization and the structure of its workflow or technology will be among the variables which exert immediate influences on the classroom processes.

Almost none of these dimensions can be exclusively defined as a simple unitary concept. Thus, for example, the variable, geographic location, could be defined so as to allow for fine distinctions within a single city, the variable local system, is susceptible of being treated to allow for differentiation between various kinds of system, and the type of school could be analyzed in a variety of ways to distinguish between such schools as elementary, junior high, senior high, combinations of these, special schools and several others. To deal fully with the component variables of all these dimensions would require a very large study, but consideration of each of them provides a firm framework within which a comparative study can focus on any particular variable or variables.

Although, in a general way, the model as illustrated in Figure 1 is to be read from left to right, causal relationships are not implied in the model, with the exception of the assumption that the geographic location of the school determines in which particular environment it operates. The nature of some variables as determinants of others is indicated by some of the studies reviewed in the previous chapter, but the findings are not such that clear causal relationships can be attributed to them, with the possible exception of size as a determinant of structure (Pugh et al., 1969; Blau and Schoenherr, 1971). Moreover, the almost certain presence of feedback effects increases the uncertainty of the attribution of causality to any one variable. Thus, although it might be supposed that the type of school would have clear effects on its technology, it would be rash to assume that changes in the technology of the school could not work in the opposite direction to bring about changes in the type of school. For this reason the lines in the illustration of the model are not shown as directional arrows.

The incorporation of any variable into any model represents some assumption about the reality which the model purports to describe. An examination of these assumptions enables a clearer understanding of the model, and, accordingly, the following section describes the assumptions contained in the present model.

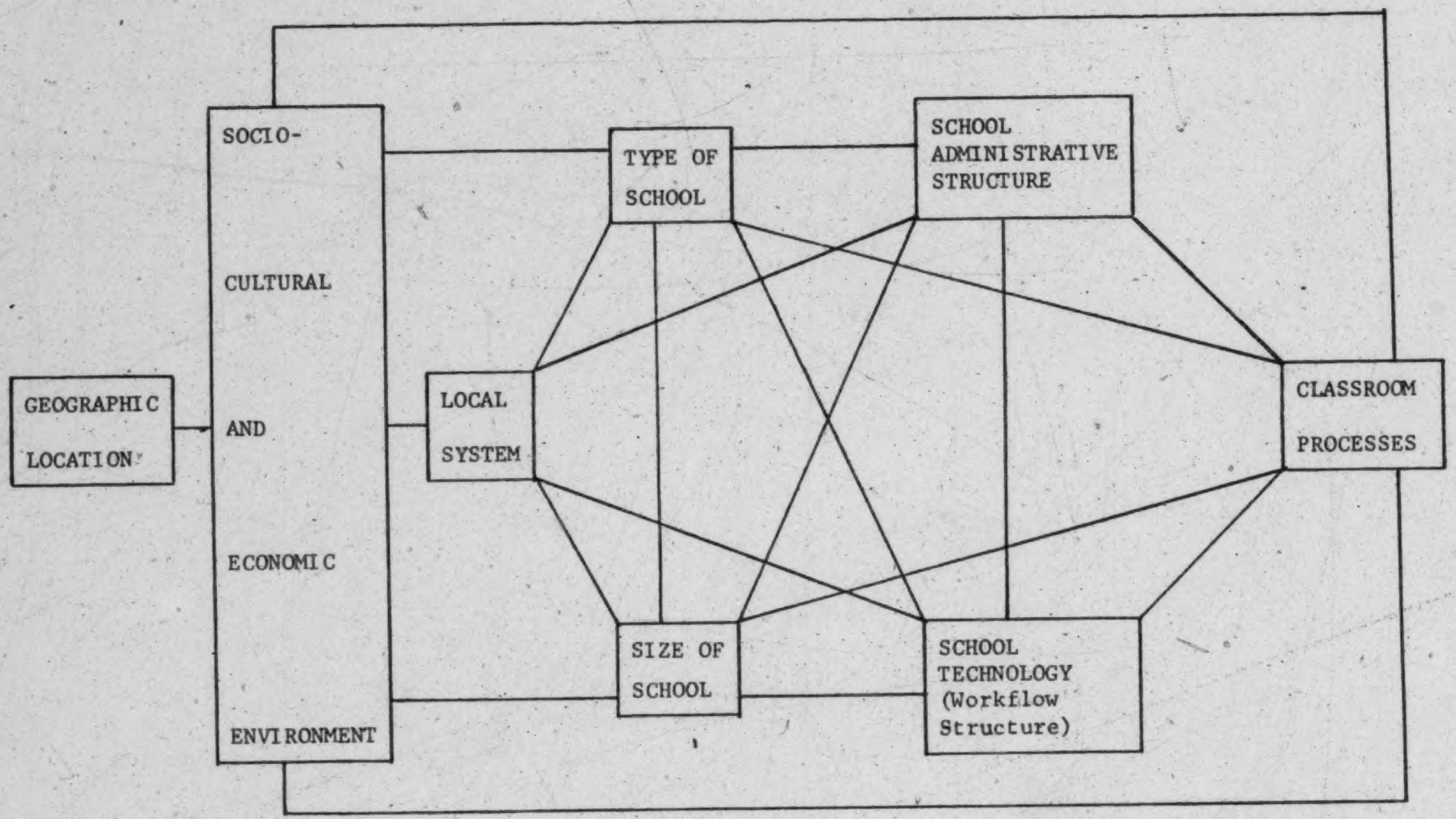
SOCIO-
CULTURAL
AND
ECONOMIC
ENVIRONMENT
GEOGRAPHIC
LOCATION
LOCAL
SYSTEM
TYPE OF
SCHOOL
SIZE OF
SCHOOL
SCHOOL
ADMINISTRATIVE
STRUCTURE
SCHOOL
TECHNOLOGY
(Workflow
Structure)
CLASSROOM
PROCESSES

Figure 1
Proposed General Model of Organizational
Constraints on Classroom Processes

Assumptions Underlying the General Model

The following assumptions underlie the model illustrated in Figure 1:

1. All school organizations exist in a socio-cultural and economic environment, and that environment impinges in some way on all processes in the school.

Although this assumption is stated in such general terms that its value may seem questionable, it is, nevertheless, an important assumption in any model for the comparative study of school organizations. It is one way of including Riggs' (1962a) concept of an ecological component in comparative studies. The point of view taken in the present study was that the number of environmental variables is so large, and that they act in such a complex way, as to make their quantification and measurement unrealistic.[5] Rather, the socio-cultural and economic environment may be seen as the source of the general set of meanings (Silverman, 1970:37) which the members of an organization have internalized and which provide what Schutz (1964) has called a "world taken for granted."[6] Such an assumption is not infrequent in education. Katz's (1965:287) statement that ". . . educational systems reflect the dominant values and assumptions of their cultural contexts" is a restatement of what is implicitly or explicitly held by most writers in comparative education, and presents a very similar notion to that of Silverman who, writing of organizations in general makes the point

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[5] One estimate is that fully to predict behaviour would require the use of over 180 variables (Sells, 1963).

[6] c.f. also McLuhan and Fiore (1967:68): "Environments are not passive wrappings but are, rather, active processes which are invisible."

(1970:37) that "the members of organizations import certain common definitions of the situation . . . into their organizational behaviour."

2. The geographical location of the school will, to a large extent, determine in which particular socio-cultural and economic environment the school functions.

Underlying this assumption is the further one that elements of the socio-cultural and economic environment vary from place to place. This is likely to be true only to a very small extent of different places within, say, one city or even one province, but it was considered a tenable assumption in the present study which examined schools from both Alberta and England. The assumption is necessary if the model proposed here is to be applicable to inter-provincial or international comparative studies.

3. A school will belong to a parent organization and will be of a given type and size.

That a school will be of a certain type and size is self-evident, although the question of various types of school raises some problems of comparability between different countries. In the present study, schools were regarded as being secondary schools, although it was recognized that, for some purposes, the Alberta composite high school is not directly comparable with the English comprehensive school. The question is discussed more fully in a later section (see pp. 67-69). The assumption that a school will belong to a parent organization makes the model inapplicable to many private schools, and may also raise minor problems of terminology in cross-national or inter-provincial studies.

4. Although any activity in a school organization is essentially activity on the part of one or more members of that organization, there exist regularities in activity which make it possible to speak of structural elements in school organizations.

This assumption is essentially a restatement of Blau and Schoenherr's argument (1971:325) by which they defend themselves against the accusation of anthropomorphism. It also provides an insight into the way in which the assumption of environmental effects may be included in a measurement of intra-organizational structures: regularities or structures may be held to arise in order to facilitate the performance of activities desired by members of the organization; what these desired activities are will be determined, at least in part, by the way in which one or more of the organization's members perceive the educational and administrative processess necessary to fulfill their role in the context of the environment in which they operate.

5. Although the local school system (parent organization) to which the school belongs will have operating policies common to all schools under its jurisdiction, each individual school will exhibit structural characteristics which may differ from those of other schools in the same local system.

This assumption is basic to all studies which seek to examine the organizational structure of individual schools. It is an assumption which is well justified in the literature on school studies reviewed in the preceding chapter.

6. Each school will use a technology which may be different from that of other schools in the same jurisdiction, and which is highly likely to be different from that of schools in a different environment.

The two parts of this assumption focus on a school's technology as the structure of its workflow activities (see below, pp. 56-59).

The first part of the assumption is similar in nature to the previous assumption in that it postulates inter-school differences in the structure of workflow activities in the same way as the previous assumption postulates differences in organizational structures in general. It also points to the separation of a workflow structure from an administrative structure, following the Aston approach (Pugh et al., 1963).

The second part of the assumption relates technology in schools more closely to the socio-cultural and economic environment. This postulated relationship stems from the broad conceptualization of technology used in the study. It is a conceptualization which includes the scope or purpose of the workflow, as well as the way it is operated. Essentially the second part of the assumption implies that the structure of a school's workflow activities may reflect differences between concepts of education in different socio-cultural and economic environments.

7. In any school, the environment, the local system, the type and size of school, the administrative structure and the structure of the workflow will impose constraints on individual classroom processes.

This assumption is a restatement of the basic idea presented in Chapter 1. It is an assumption which is implicit in all studies of elements of school organization structures. In the present study the assumption was not tested, nor was any attempt made to examine ways in which the various elements described might impose their constraints on the processes taking place in any given classroom. The assumption is stated in the present context both as a way of completing the conceptual model and as a fundamental part of the justification for the study.

THE EXPANDED MODEL AND THE MULTI-DIMENSIONAL VARIABLES

The conceptualization of the variables in the general model draws heavily on the work of the Aston researchers and, similarly, makes a distinction between structure and context in an organization (see above, pp. 16-20). There are, however, three ways in which it differs from the Aston conceptualization. First, the variable of location is redefined so as to permit the specific inclusion in the model of a socio-cultural and economic environment. Second, for the reasons given in the previous chapter (pp. 32-35), four of the Aston contextual variables are omitted as being either irrelevant to or unsuitable in a study of school organizations. Third, the contextual variable of technology is conceived here as a multi-dimensional component of context rather than as a unitary variable.

The expanded illustration of the general model (Figure 2, p. 58) shows the component elements of structure which are taken from the Aston research. It also shows the component elements of school technology. Following the Aston work, the elements of structure exclude the workflow processes. However, since it is possible to conceive of a structure in the workflow processes, some confusion arises if the term structure is to be applied only to non-workflow activities. The present model resolves this problem by specifying the two kinds of structure as the administrative structure and the workflow structure or technology. In the following paragraphs a description of the conceptualization of each of these two dimensions is preceded by an explanation of the concept of structure itself.

The Concept of Structure

As noted in the previous chapter, the concept of structure in studies of school organizations has been variously treated and usually very broadly defined in some such terms as "organizational arrangements" or "patterned activities." One study (Hersom, 1969) used a definition which incorporated a more purposive element and referred (1969:35) to "regular patterns of activities developed within a school to facilitate the achievement of its aims." This latter definition, in that it adds a functional dimension to the purely descriptive one of the shorter, broader definitions, is more specific and hence seems a more useful concept upon which to base an empirical study. It might be argued, however, that the idea of facilitation is misleading as the sole functional component in a definition of structure, since, although a structure may facilitate some activities, it may also impede or constrain others.

Alternatively expressed, this argument might be construed to refer to the degree to which the activities of organization members are facilitated. Following this alternative construction, the concept of structure may be given a sharper focus if it is viewed as that which prescribes the roles of organization members, and distinctions between different structures could then be in terms of the degree to which they specified these roles. This view has been put forward by Hickson who, reviewing the work of those concerned with the structure of organizations, writes (1966:225): "Theory has converged upon the specificity (or precision) of role prescription and its obverse, the range of legitimate discretion."

Broadly interpreted, structure as specification can refer not only to formal, written job specifications, but also to specifications inherent in such elements as the topological shape of the organization or the division of labour in the organization or the accepted levels of decision-making. If the added concept of "role" is rather less precise (Chinoy, 1954:24; Getzels et al., 1968:59-60; Levinson, 1959:170), that of activities is not. Since it is arguable that an organization's roles are specified solely in order that the activities of the organization's members may be directed one way rather than another, it is possible to argue further that structure exists to specify the activities of the members of an organization. Thus structure can be conceived as the way in which the activities which take place in an organization are specified or regulated.

This concept is very close to that used in the Aston studies (Pugh et al., 1963:299-301; Hickson, 1966:236), and can be equally well applied to both administrative and workflow activities.

The Administrative Structure

The idea of a specifically administrative structure in organizations is well established in the literature and its purpose is generally seen as some form of co-ordination--linking and integrating (Mann, 1965), co-ordination and conflict resolution (Katz and Kahn, 1966), co-alignment (Thompson, 1967). In that the concept of structure in the Aston studies relates to these kind of activities and excludes workflow activities, their work on organizational structure may be regarded as referring to the administrative structure of organizations.[7]

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[7] Although the Aston publications tend to use the term "organizational structure," the authors use "administrative structure," apparently as a synonym for "organizational structure" in several places (c.f. Pugh et al., 1969:109, 112; Inkson et al., 1970:319).

The results of the Aston work indicate the existence of two major and two minor structural variables in organizations. In the present model the two major dimensions and one of the minor dimensions are regarded as the component variables of the administrative structure. Specifically these three variables are Structuring of Activities, Concentration of Authority and Size of Supportive Component.

Structuring of Activities. Structuring of Activities refers to the extent to which the activities of employees are formally regulated. It is itself made up of two variables: Functional Specialization and Formalization of Role Definition. Functional Specialization is a measure of the degree of division of labour in an organization. If an organization member is assigned a specific, specialized, non-workflow task on a regular basis for which he alone is responsible, then this assignment is held to be evidence of some division of labour in the organization and, since the assignment is specific, it may also be seen as some measure of specification of that particular member's activities. In the application of this Aston concept to school organizations the various teaching specializations by department or subject area are not counted as evidence of functional specializations since they are specializations within the workflow.

The variable of Formalization of Role Definition describes the extent to which roles or activities are specified by written documents. The degree of formalization of role definition is assessed by the number of specific documents (from a set list) which exist in the school and, in some cases, by the extent of their distribution.

Concentration of Authority. Concentration of Authority refers to the levels at which formal authority rests. It is an element of structure, as conceived here, because it describes the degree of discretion in decision-making which is permitted in the organization. The legitimate authority to make decisions may reside at levels within or without the organization and certain questions may legitimately be decided by personnel at certain levels. The greater the number of decisions which must be taken outside the organization (i.e., at a level above that of principal or headmaster), the less will be the organization's Autonomy. Although the local school system policies will probably specify which decisions are to be taken inside and outside the school, the schools in any one jurisdiction may differ with respect to the levels at which different in-school decisions are taken.

Size of Supportive Component. This variable describes the proportions of non-workflow, non-control auxiliary staff (such as secretaries, clerks, caretakers) in the school. Although the variable was of relatively minor importance in the Aston studies and was omitted from the short-form version of the Aston instrument, it is included in the present model for two reasons: first, previous work (Gregory, 1972) indicates a relationship between aspects of configuration and the size of schools and second, the size of the supportive component may be associated with aspects of the school's technology in that some schools may define the teacher's task in such a way as to necessitate a larger clerical staff to perform what, elsewhere, are teacher responsibilities.

Technology: The Structure of the Workflow

The way in which the technology of organizations has been variously conceived has been described in the previous chapter (pp.21-27). The conceptualization of technology in the present model is based more on the work of Perrow (1967; 1970) than on the work of the Aston studies. To recapitulate briefly Perrow's argument: the technology used in an organization is a function of the perceived characteristics of the raw material which is being processed and the number of exceptional cases which are encountered in working with it. Following Charters (1964:246) students can be viewed as the raw material with which a school works. Perrow's argument then becomes: the technology of a school is a function of the way students are perceived and the number of exceptional cases encountered in working with them. For Perrow (1970:75-85) this would lead to a distinction between school technologies in terms of the degree of their routinization.

Routinization and diversification. In the typical school some routinization appears to be unavoidable if teachers and students or students and books or equipment are to be able to come together in an economical way, and routinization may not be the best concept with which to examine the technology of schools. A more appropriate way, and one which focusses on the perceived nature of the student, may be to examine the extent to which the school caters for a diversity of talents and interests. A school in which each pupil is regarded as an individual who can best be educated by being allowed to work at his own pace and on his own personally selected program must, if it is to educate in accordance with this belief, diversify its educational offering. In contrast, a school in which students are perceived as cohorts of young people, all of whom need the same fundamental education and all of whom can respond to the same teaching stimuli has no need of a diversity of approaches. From this perspective, the extreme approaches characterized, the one by Bentham (Bowring, 1962) and the other by A.S. Neill (1962), are not extremes on a continuum of routinization, but on a continuum of diversification.

Diversification of what? In order to measure the degree of diversification of a school's workflow it is necessary to specify which elements of a workflow might be diversified. The present model conceptualizes six such elements. The elements of Equipping and Sequencing are used in the Aston studies and are retained here. Also used in the Aston studies is the element of the evaluation of workflow processes. In schools the evaluation of pupil progress is closely linked with the reporting of that progress, so that this element is specified here as Evaluation and Reporting. The way students are placed in the various areas of a school's workflow has implications for their program and, accordingly, Placement of pupils is regarded as a distinct element of a school's technology. The way in which Control over raw materials is exercised in a manufacturing organization stems from the perceived nature of those materials and the importance of pupil control in school organizations has been strongly attested (Willower and Jones, 1967; Willower et al., 1967). Finally, the element of Scope is included as being an important element of technology in the broad sense in which

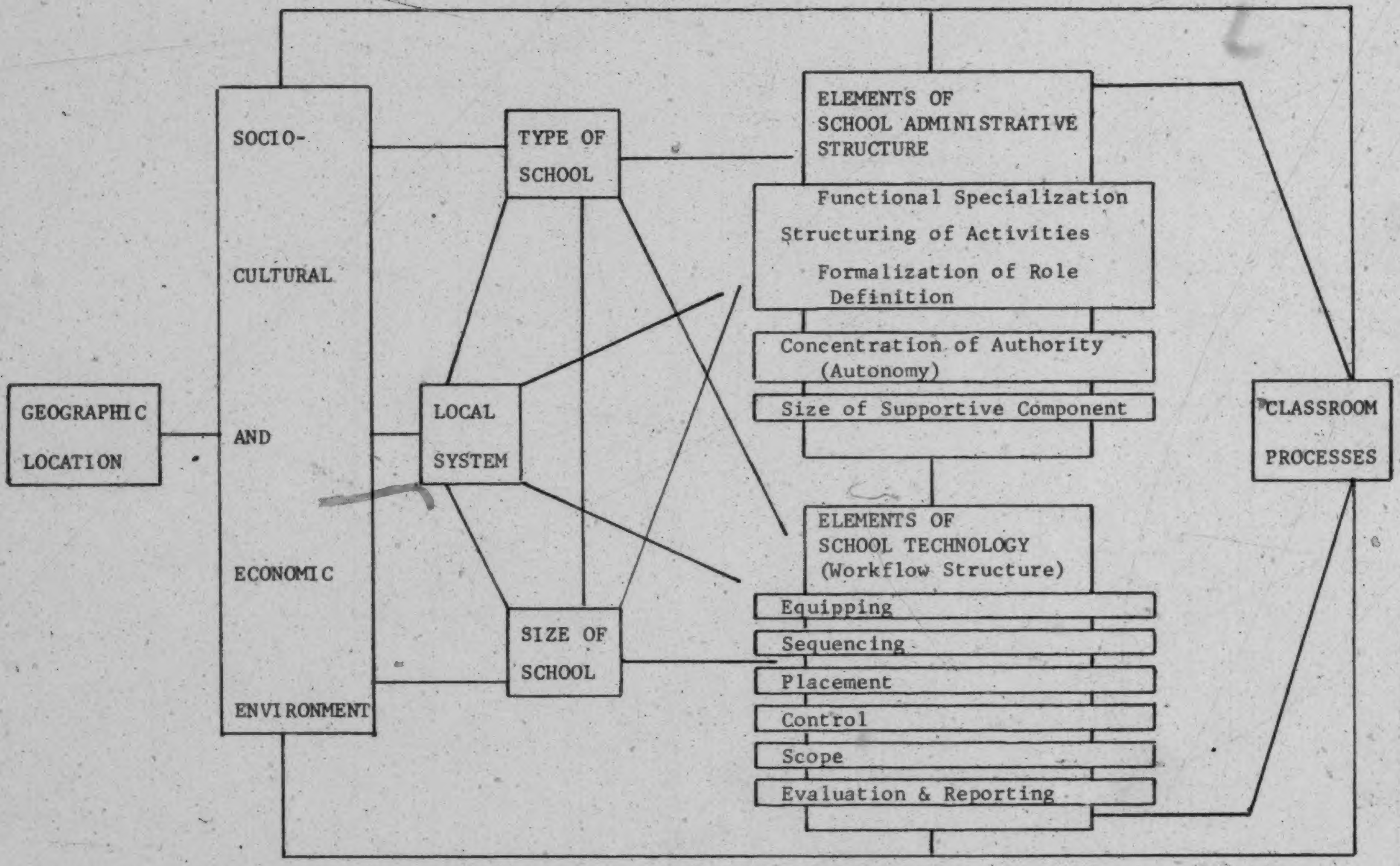
GEOGRAPHIC LOCATION
SOCIO-
CULTURAL
AND
ECONOMIC
ENVIRONMENT
TYPE OF SCHOOL
LOCAL SYSTEM
SIZE OF SCHOOL
ELEMENTS OF SCHOOL ADMINISTRATIVE STRUCTURE
Functional Specialization
Structuring of Activities
Formalization of Role Definition
Concentration of Authority (Autonomy)
Size of Supportive Component
ELEMENTS OF SCHOOL TECHNOLOGY (Workflow Structure)
Equipping
Sequencing
Placement
Control
Scope
Evaluation & Reporting
CLASSROOM PROCESSES

Figure 2
Expanded Model of Organizational Constraints
on Classroom Processes

technology is conceived in the present model.[8]

THE STATEMENT OF THE PROBLEM AND THE DEFINITION OF TERMS

The Problem and Sub-problems

The problem was stated in a general way as follows:

> To devise measures of school administrative and workflow structures which will discriminate between schools in one or both of two different socio-cultural and economic environments, and which may thus be used to support or modify the proposed general model of organizational constraints.

As a guide to the research the constituent parts of the problem were expressed as sub-problems in the following form:

Sub-problem 1. To devise measures of school administrative and workflow structures by:

(a) Adapting the Aston measures of the administrative structure of organizations for use in schools, and

(b) Constructing an instrument which will give a measure of a school's technology in terms of the diversification of its workflow.

Sub-problem 2. To refine the instruments devised in Sub-problem 1 by the use of tests of internal consistency using data obtained from twenty-one schools.

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[8] The inclusion of scope as an element of technology marks another important difference from the Aston conceptualization in which scope would appear to be more nearly related to charter than to technology. However, in that the scope of a workflow is closely related to its purpose it is usefully seen as an aspect of technology as conceived here, since the characteristics of any raw material are perceived relative to what it is to be turned into.

The point can be illustrated by considering the technology of processing pieces of wood. If the purpose is to make firewood, the raw material is uniform, there are few exceptional cases and the technology will not be diversified. For the creation of carvings each piece of wood is a unique case and the technology may be highly diversified.

Sub-problem 3. To examine the data retained after the refinement process so as to assess the discriminatory power of the refined instruments and the external validity of the measures by:

(a) Examining the extent to which the refined instruments discriminated between schools in terms of their administrative structures

(b) Examining the extent to which the refined instruments discriminated between schools in terms of their workflow structures, and

(c) Examining the relationships among variables as measured by the instruments.

Sub-problem 4. To examine the extent to which the measures permitted a comparison between the schools grouped according to local system and geographic location by:

(a) Investigating the differences in variables of Size, Structure and Technology between schools grouped according to local system, and

(b) Investigating the differences in variables of Size, Structure and Technology between schools grouped according to geographic location.

Sub-problem 5. To revise the proposed model of organizational constraints as a result of the analyses performed for sub-problems 1 to 4.

The Definition of Terms

The major concepts used in the study have been discussed in the earlier sections of this chapter. Their operational definitions, together with those of other terms used in the study are as follows:

Structure. Structure refers to the ways in which the activities in a school are specified or regulated.

Administrative structure. The administrative structure of a school is its non-workflow structure. It consists of three elements: Structuring of Activities, Concentration of Authority and Size of Supportive Component. Thus a school's administrative structure cannot be described in terms of a single variable; rather, each school will exhibit a structural profile which will include a description of each of these dimensions.

Structuring of Activities. Structuring of Activities refers to the definition or regulation of staff members' activities by task specialization and written role-defining documents.

Functional Specialization. Functional Spectialization refers to the division of labour among the non-workflow tasks of the school. The degree of Functional Specialization in a school is assessed by considering the number of activities (from a set list) which are performed in the school, the number which are specifically and exclusively delegated to one or more staff members, and the number of different people or groups to whom such delegations are made.

Formalization of Role Definition. Formalization of Role Definition is the specification of roles or activities by written documents. The extent of Formalization of Role Definition in a school is assessed by the number, and in some cases by the extent of distribution, of such documents.

Concentration of Authority. Concentration of Authority refers to the levels at which formal authority rests, the lowest level being that of teacher, the highest being that of a government ministry.

Autonomy. Autonomy is the degree to which decisions may legitimately be made within the school itself. The greater the number of decisions (from a set list) which can legitimately be made by personnel within the school, the greater is that school's autonomy.

Supportive Component. The Supportive Component consists of those school employees who are not teachers or administrators holding teaching certificates. The size of the Supportive Component will usually be expressed as a proportion of total employees.

Technology. Technology is the term given to the school-wide policies and practices governing the scope of the school's workflow, the distribution of resources and the handling and evaluation of students in matters pertaining to the education of those students.

Workflow. The Workflow activities of the school are those activities which are directly concerned with the education of students.

Diversification of workflow. The diversification of workflow refers to the structuring of any aspect of the workflow in such a way as to increase the number of ways in which that aspect may be handled.

Location. Location is the geographic location of the school. In the present study the location of schools was either Edmonton, Alberta or the West Riding of Yorkshire in England.

Local system. The local system means the jurisdiction to which a school belongs. In Alberta local systems are managed by School Boards, in England by Local Education Authorities (L.E.A.'s).

Size. The size of a school is the number of its enrolled students at the beginning of the academic year, 1971-72.

Secondary school. For the purposes of this study a secondary school means a school in which pupils may be enrolled for that phase of their education which precedes employment or university or college entrance.

Chapter 4

RESEARCH METHODOLOGY

The design of this study as a comparative study which would assess the applicability of the Aston measures in schools necessitated a certain kind of sample and certain kinds of data and their treatment. Each of these elements is described in this chapter.

THE SAMPLE

The sample for the study consisted of twenty-one schools. Six of the schools were senior high schools of the Edmonton (Alberta) Public School District (E.P.S.D.), six were senior high schools of the Edmonton Separate School District (E.S.S.D.) and nine were comprehensive schools under the jurisdiction of the Education Department of the County Council of the West Riding of Yorkshire in England (W.R.C.C.). The schools were selected partly for their accessibility to the researcher, but largely so that contextual variables in the proposed model of organizational constraints (see above, pp. 44-47) could be controlled. Although the sample cannot be regarded as representative of all secondary schools in either Alberta or Britain, the schools in it may be regarded as representative of the schools of their type and size in each of the three jurisdictions since they make up seventy-five percent of the total number of similar schools in the three local systems.[9]

The Size of the Schools

The enrollment in the schools in the sample ranged from 633 to 2507 in September of the academic year 1971-72. Table 1 shows size means and ranges for the schools grouped by local system and by geographic location.

The greatest mean size of school was in the E.P.S.D. (1729), the smallest in the E.S.S.D. (1115). The largest size range (633-2100) was in the E.S.S.D., the smallest (1109-2507) in the E.P.S.D. When schools were grouped by geographic location the mean size of the Alberta schools was 1422 and of the West Riding schools 1509. The ranges of size in the two groups were 633-2507 and 1035-1800 respectively.

These differences are not of statistical significance at the 0.05 level of probability. Table 2 shows the results of an analysis using the Kruskal-Wallis one-way analysis of variance by ranks. This yields a result of $H = 4.765$ for the difference between schools ranked in three groups (E.P.S.D., E.S.S.D., W.R.C.C.) and of $H = 0.182$ for the difference between schools ranked in two groups (Alberta, West Riding). The value of H required for significance at the 0.05 level of probability in the first case is 5.99 (DF = 2), and in the second case 3.84 (DF = 1). Thus the groups formed by arranging schools according to either their local system or their geographic location were considered to be comparable in the size of the schools they total number of similar schools in the three local systems.[9]

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[9] Detailed figures are as follows: the E.P.S.D. sample contained six out of a possible twelve senior high schools with a staff of twenty-four or more; the E.S.S.D. sample contained six out of a possible seven such schools; the W.R.C.C. sample contained nine out of a possible ten all-through comprehensive schools.

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Table 1

Sample Schools: Size Means and Ranges

	Schools Grouped by Local System			Schools Grouped by Geographic Location	
	E.P.S.D.	E.S.S.D.	W.R.C.C.	Alberta	West Riding
Mean	1729	1115	1509	1422	1509
Range	1109-2507	633-2100	1035-1800	633-2507	1035-1800

Table 2

Kruskal-Wallis One-Way Analysis of Variance
by Ranks among Sizes of Schools
Grouped by Local System and
by Geographic Location

	Schools grouped as:	
	E.P.S.D./E.S.S.D./ W.R.C.C.	Alberta/ West Riding
H obtained	4.765	0.182
H (x^2) required for significance ($p = 0.05$)	5.99 (DF = 2)	3.84 (DF = 1)

contained, although the relatively higher H value for the difference between schools grouped by local system probably reflects the disparity in mean sizes in the two Alberta systems.

Type of School

All schools in the sample were secondary schools. The choice of secondary schools was made partly because of the preponderance of studies of school structure which have dealt with other kinds of school, and partly because the greater size and complexity of most secondary schools made it likely that they would exhibit to a greater degree than elementary schools the elements of structure examined in this study.

One difficulty with the choice of a secondary school sample was that questions may be raised as to the comparability of the Alberta senior high school and the West Riding comprehensive school. The position taken in this study was that the two were comparable in two main ways: first they are institutions whose students are not selected by ability and which provide the last continuous stage of education before employment or entrance to higher education, and second, they are, or will be, typical of the institutions which provide this education in Canada and Britain respectively.[10]

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[10] The definition of a typical secondary school in Britain is difficult since there are many local variations in school organization. Present arrangements include the old type of selective grammar school and its concomitant secondary modern school as well as four kinds of comprehensive school.

Circular 10/65 of the British Department of Education and Science used the term "orthodox" comprehensive school to describe those schools which took all secondary school children in a neighbourhood and offered the full range of courses for them between the ages of 11 and 18. Burgess (1970:167-176) gives figures to show that, although in 1969 only twenty-six percent of the secondary school population in Britain were in comprehensive schools, approximately seventy-six percent of local education authorities had plans for comprehensivisation approved or implemented in 1970. Of these plans, forty-five percent were for all-through schools (ages 11-18), twenty percent for "two-tier" schools, twenty percent for "middle" schools and fifteen percent for sixth form colleges.

The attributes of the schools in the three local systems are summarized in Table 3 in a form which shows their similarities and dissimilarities. Of the three dissimilarities two were not considered serious impediments to a comparison. The fact of the different religious affiliation in the three systems is an educational fact of life in the two countries, each of which has adopted a different way of accommodating community differences in beliefs within its educational system. The fact that all the Alberta schools were urban whereas the West Riding schools were not was largely offset by the very different demographic situations in the two areas: none of the West Riding schools is more than twelve miles from a major city (some are close to two cities), and most pupils in them come from families employed in industry, commerce or the professions.

The third dissimilarity--that of the very different age ranges of the pupils in the schools--appeared to be a more serious problem. In the context of English education, however, a school catering for the age range of the Alberta senior high school is far less typical of any local education authority than is the 11 to 18 all-through comprehensive school. Not only would it be difficult to find an adequate number of schools catering for the 15 to 18 age range (sixth form colleges) in any one local education authority, it would also be misleading to equate such schools with the Alberta senior high school since their pupils form a far narrower segment of the population in their age range than do the pupils of the senior high school. In an English education system which has been based on differential schooling for pupils of different measured ability, the emergence of the all-through comprehensive school has resulted in an institution which is

Table 3

Attributes of Schools in the Three Local Systems

	E.P.S.D.	E.S.S.D.	W.R.C.C.
SIMILARITIES	Publicly financed Non-residential Co-educational Non-selective Provide last continuous stage of education pre-employment or higher education	Publicly financed Non-residential Co-educational Non-selective Provide last continuous stage of education pre-employment or higher education	Publicly financed Non-residential Co-educational Non-selective Provide last continuous stage of education pre-employment or higher education
DISSIMILARITIES	No religious affiliation Urban Age range 15 - 18+	Roman Catholic affiliation Urban Age range 15 - 18+	Protestant non-denominational Semi-urban or rural Age range 11 - 18+

more comparable to the Alberta high school than are other forms of English secondary school organization.

THE DATA

The method of data collection used in the study followed that used in the Aston studies as described and justified by Pugh et al. (1968:67-69). The resulting data describe what is officially expected should be done in the school and what in practice is allowed to be done. They do not describe any departures from official practice which may occur. Thus, for example, if a document exists for a given purpose it may be taken as evidence of formalization irrespective of whether it is used in practice or not. The details of the data collection and a statement of the reliability of the data are dealt with in the following paragraphs.

Data Collection

Data were collected in two ways: by interview with the principal or headmaster (or, in one case, his deputy) of each school, and by the perusal of documents obtained from him and from the central office of the local system to which his school belonged. These main data sources were supplemented in every school by less formal interviews with one or more other members of the school administrative staff, and in each of the three local systems an interview was held with one senior system administrator. In most cases principals and headmasters permitted an extensive tour of the school facilities and in every case they arranged for the researcher to meet appropriate specialists in such areas as time-tabling, audio-visual co-ordination and school business management.

Interviews. All interviews with principals or headmasters and with local system administrators were carried out following an identical interview schedule (see Appendix A) and were tape-recorded. Interviews varied in length between one hour and three and a half hours. The only changes made in the wording of questions in different interviews were changes necessitated by differing terminologies in Alberta and the West Riding. The alternative forms used are shown in parentheses in the interview schedule in the appendix, and where different terms were used the respondent was asked to describe what he understood by the term before the question was put. With the use of this procedure the only major difficulty in equating Alberta and West Riding terminologies was in the names of the subjects taught. In Alberta the names given in the Senior High School Handbook (Government of Alberta, Department of Education, 1971) were used and many of these were either meaningless to West Riding headmasters or misleading in that a common name masked a very different curriculum in the two places. In all cases the procedure followed was to obtain a description of the relevant West Riding syllabus. Since the purpose of this part of the interview was to obtain a count of the number of subjects and program areas offered in the school rather than to equate Alberta and West Riding curricula, the above procedure was a satisfactory one.

Prior to the coding of responses for analysis all tape recordings of the interviews were replayed. In four cases subsequent telephone calls were made to verify responses given at the original interview.

Documents. Principals and headmasters were asked to supply copies of all current school handbooks, written policy statements, standing instructions, school calendars, class lists, time tables, staff lists, staff job descriptions and similar materials. Specimen copies of weekly bulletins, administrative memoranda, departmental regulations, internal forms and student report cards were also obtained, as were copies of such items as school newspapers and letters to parents. Several schools were also able to supply various other supplementary written materials, and each local system supplied copies of regulations or handbooks which applied to the schools in their jurisdictions.

The variety of documents in use was considerable and different titles were used for similar documents in different schools. To ensure as complete a set of documents for each school as possible, requests for documents referred to their function rather than their title. This method proved satisfactory except for the collection of documentary evidence of class size throughout the school. In the Alberta schools this information was available in the form of an exhaustive set of computer printouts showing enrollments in every class throughout the day. In the West Riding schools no such documents were available but equivalent information was found on the school copy of Form 7 (schools) which is a return made by each school to the British Department of Education and Science and which includes a detailed breakdown of class sizes in one randomly selected period. These data were required in the study in order to assess the variation in class size in any given school and for this purpose the Form 7 (schools) proved a satisfactory source of information.

Although documentary evidence was primarily used in the examination of the variables of formalization and technology, the documents were also perused in order to confirm interview responses pertaining to the other variables used in the study.

The Reliability of the Data

The reliability of the data was increased by the use of a standard interview schedule and by the request to respondents to define concepts and terms when there was doubt about their equivalence in the two areas from which the sample was drawn. The use of documentary sources and an interview with a local system administrator gave some verification of the responses of principals and headmasters. Similarly conversations with other members of school staffs and visits to different areas of school plants were used to verify the interview responses.

THE TREATMENT OF THE DATA

The manner of scoring the responses was an integral part of the work of adapting and constructing the instruments and is therefore dealt with in the following chapter. It is sufficient to note here that, as in the Aston work, some items had binary responses and some multiple category responses, and that response categories were finalized only after pilot interviews with the instruments had been carried out.

These pilot interviews were conducted in four Edmonton high schools two to three weeks before the main data collection period. In addition to being asked to respond to the questions as put, respondents were asked to comment on the appropriateness of the response categories and, where these seemed inappropriate, to suggest amendments. As a result of these suggestions several changes were made in the wording of questions or response categories and these are indicated in the description of the development of the instruments in Chapter 5.

At the conclusion of the data collection in the sample of twenty-one schools responses were scored and the scores transferred to punch cards. Computer programs which either existed already or were developed for the study were used for the analysis of the data.

Two kinds of statistical analysis were carried out: tests of internal consistency among items considered to measure a given dimension, and tests of the relationships between different variables. These tests and the decision rules used in applying them are summarized in Table 4 (p. 89). Before describing them in detail it is necessary to consider the nature of the sample used and its effect on the selection of analytical procedures.

The Sample and Sub-samples

From one point of view the schools in the sample constituted a single sample drawn from the population of secondary schools in the medium to large size range. But from another, and possibly more realistic point of view, they fall into two sub-samples drawn respectively from secondary schools in Alberta and the West Riding. These may be held to be different populations of secondary schools in that they each belong to different socio-cultural and economic environments. This view of the schools had implications for the way in which tests of the internal consistency of instruments were applied and for the selection of tests of the association between variables.

The tests of internal consistency described below are tests of the extent to which the items in a given instrument discriminate between schools on one dimension of organizational structure or operation. However, as Thurstone (1947) points out in an early discussion of factor analysis, ". . . factors cannot be expected to be invariant from one population to a different population." To derive a factor or dimension from the presence of associated items in the responses from combined but different populations may be to isolate as a factor that which is merely an average between the two populations. Thus, for example, as Fruchter (1954:200) notes, tests which incorporated a measure of physical strength would need to be built separately with samples of men and women if they were to avoid being based on a relatively meaningless average. Similarly, if there should be some inherent difference in the structure or operation of secondary schools in Alberta and the West Riding, to derive a unidimensional set of items from the analysis of the scores of both groups combined might be to achieve nothing more than the isolation of those items which expressed the average between the two groups.

This is not to say that the analysis of the two groups as one sample is a valueless procedure. On the contrary, to the extent that one of the objectives of the study was to obtain a comparative instrument which would measure those dimensions held in common by each group, it was a necessary procedure. It was necessary, however, only in conjunction with analyses made of the Alberta and West Riding groups as separate sub-samples. Thus, each of the tests used in the study was used three times for any given instrument: once on the responses from the whole sample, once on those from the twelve Alberta schools and once on those from the nine West Riding schools. Wherever possible in the refining of the instruments by statistical tests of internal consistency, only those items were retained which in all three applications of the test met the criteria for retention.

This procedure also made advisable the choice of nonparametric statistical tests where possible rather than the more usual parametric tests. Even in the whole sample, the N was not large; in using the separate sub-samples the very small sub-sample sizes ($N = 12$, $N = 9$) made the use of parametric tests inappropriate (Siegel, 1956:32). Further, as Siegel points out (1956:32-33), nonparametric tests are the only tests which can treat data from two different populations without the use of unrealistic assumptions. One further reason for the choice of such tests was that, although the schools in the sample can be regarded as representative of the secondary schools in their areas, the characteristics of the general population of secondary schools are not known and therefore the assumption of normal distribution of the variables in the population--an assumption underlying parametric tests--could not be made.

Tests of Internal Consistency

Tests of internal consistency were carried out on the data collected to describe four of the variables used in the study--Functional Specialization, Formalization of Role Definition, Concentration of Authority and Diversification of Workflow.[11] Each of these variables was measured by a different series of items, and the tests of internal consistency were used to ensure that (1) each item was contributing to the discrimination between schools in terms of the variable it purported to measure, and that (2) a theoretically homogeneous set of items was also statistically homogeneous.

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[11] The fifth structural variable, Size of Supportive Component, was measured directly by numbers of personnel employed.

Three different tests were used: item analysis, an analysis of the degree of association between items and a split-half reliability test. All three were used on the items in the Diversification of Workflow instrument. In the instruments adapted from the Aston work only item analysis and the split-half reliability test were carried out.

Item Analysis

In the Aston studies each set of items developed to measure the dimensions of organizational structure was subjected to item analysis to confirm that the items measuring any given dimension approximated a Guttman scale. The necessity for repeating item analysis for the measurement of the Aston dimensions in the present study arose for two reasons: first, the adaptations which were made of the Aston instruments transformed the wording of almost all items and retained only the conceptual unity of the Aston measures, and second, the organizations in the Aston sample, unlike those used here, had a variety of functions.[12]

Levy and Pugh (1969) have described in detail the rationale for the use of item analysis in the Aston studies and, in particular, for the use of the particular index of fit (the Brogden coefficient) which was applied to all the Aston scales. The rationale may be summarized as follows:

1. A structural property of organizations may be described in

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[12] c.f. Newberry (1971) who repeated item analysis for similar reasons in his study of college structures. Newberry's adaptations of the Aston instruments incorporated fewer changes than those in the present study.

terms of a set of items held to be indicative of that property. For example, an organization's degree of specialization may be assessed by counting how many of a given set of specialisms can be observed in that organization.

2. Such a "count" of items, however, would yield only a very crude measure unless it could be demonstrated that there was a relationship between the presence or absence of each item in any given organization and that organization's total score and unless it could be further demonstrated that the items were unidimensional. In other words, the measure would be crude unless it could be demonstrated that the items formed a scale in the Guttman sense.

3. To do this the items would have to be such that, ideally, "organizations in which a given item was observed all scored higher than those organizations in which it was not observed" (Levy and Pugh, 1969:195, paraphrasing Stouffer, 1950:9). A matrix display of such item scores in a set of organizations ranked by total score would yield a perfectly triangular pattern.

4. Since perfect scalability (the perfect triangular pattern) is virtually unattainable (Guttman, 1950), the question becomes one of assessing the degree to which items fail to conform to a perfect scale pattern. Two main kinds of analysis have been developed to cope with this problem: (a) scalogram analysis, and (b) item analysis.

5. Scalogram analysis deals with the problem by the use of the coefficient of reproducibility which seems unsatisfactory for two reasons: (a) its use with dichotomous items (e.g., the endorsement or non-endorsement of a specialism by an organization) implies that one is attempting to ". . . reproduce the perfect triangular pattern

in terms of the observed and fallible row and column totals rather than in terms of the true ranking of these" (Levy and Pugh, 1969:197), and (b) it fails to take account of the severity of departures from the pattern.

6. Item analysis is to be preferred because it avoids these disadvantages and measures the goodness of fit of an item as a correlation between the item responses and the total scores. Of the variety of coefficients which may be used to express this relationship the biserial coefficient seems most appropriate since "it remains unaffected by the possibility that the rarity value of a particular item may vary from sample to sample" (Levy and Pugh, 1969:199). One particular biserial coefficient (Brogden, 1949) is useful where a normal distribution cannot be assumed, since it does not require such an assumption. The use of this coefficient enables one to determine which items are to be rejected in order to improve the approximation to a Guttman scale.

The Brogden coefficient (GBR). Levy and Pugh (1969:199) have used the term "general biserial correlation coefficient" to describe the coefficient developed by Brogden. The present study retained their title and its abbreviation, GBR. The logic of the GBR is as follows: if an item discriminates well between the high and low scoring organizations, then the mean score of all organizations which endorse the item will be higher than the mean score of those that do not. This statement may be expressed as an equation, thus:

$$GBR = \frac{m_1 - m_0}{M_1 - M_0}$$

where:

m_1 = the mean score of organizations endorsing the item under study

m_0 = the mean score of organizations which do not endorse the item under study

M_1 = the mean of the topmost N scores, where N is the number of organizations endorsing the item under study

M_0 = the mean of the lowest P scores, where P is the number of organizations which do not endorse the item under study

An example may serve to clarify the way in which the GBR is calculated. Suppose that ten schools have each responded to questions about the presence or absence of each of seven items, and that their responses may be tabulated as follows:

	Items							
Schools	1	2	3	4	5	6	7	Score
1	1	1	0	1	1	1	1	6
2	1	0	0	1	1	1	0	4
3	1	1	0	1	1	0	1	5
4	1	0	1	1	1	1	0	5
5	1	1	1	0	0	0	1	4
6	1	1	0	0	0	1	1	4
7	1	1	1	0	0	0	0	3
8	1	1	0	0	0	0	0	2
9	1	0	0	1	0	1	1	4
10	1	1	1	1	0	0	1	5

Using the symbols defined above the calculation of the GBR for item 7 would be:

$$N = 6$$

$$P = 4$$

$$m_1 = \frac{6 + 5 + 4 + 4 + 4 + 5}{6} = \frac{28}{6} = 4.667$$

$$m_0 = \frac{4 + 5 + 3 + 2}{4} = \frac{14}{4} = 3.500$$

$$M_1 = \frac{6 + 5 + 5 + 5 + 4 + 4}{6} = \frac{29}{6} = 4.833$$

$$M_0 = \frac{2 + 3 + 4 + 4}{4} = \frac{13}{4} = 3.250$$

$$GBR = \frac{m_1 - m_0}{M_1 - M_0} = \frac{4.667 - 3.500}{4.833 - 3.250} = \frac{1.167}{1.583}$$

$$= 0.737$$

A calculation of the GBR for item 3 in the above example gives GBR = 0.049. Clearly, item 7 is a better discriminator than item 3, on which only two of the endorsing schools have a total score which is among the topmost four scores. In refining the set of items, therefore, we may choose to retain item 7 and drop item 3. Having made this decision, it is necessary to recalculate the new GBR for each of the six items retained since the dropping of one item will change the total scores and hence the relationships between the other items and the scores.

Two questions arise from this procedure: (1) What value of GBR will be regarded as acceptable for the retention of an item? and (2) How long does one continue the process of dropping items and recalculating the GBR for the remainder? As in all statistical analyses the decision is an arbitrary one, but the answers to both questions may be guided by Sachs' (1964:334) statement that in test construction a mean biserial coefficient of 0.40 is considered adequate. In the present study a GBR value of 0.40 was regarded as the minimum acceptable for any item except that, following Hickson and Thomas (1969:52), it was on rare occasions necessary to retain an item with a lower GBR because ". . . a judgement has to be made on the appropriateness of each item which takes into account both its coefficient and its conceptual relevance."[13]

The second question was answered partly by the criterion stated above, but also by the decision to accept a set of items only if the mean GBR of those items exceeded 0.63 which was the lowest mean GBR reported by the Aston researchers in their analysis of those scales which were taken as the basis of the present study (Pugh et al., 1968: 92-102). The one exception was in the case of the items retained for the measurement of the total score on Concentration of Authority, in which, for the whole sample, the mean GBR was 0.416. This particular set of items discriminated well among the schools of each of the sub-samples and the special reasons for accepting the relatively low mean GBR across the whole sample are discussed in Chapter 6.

Item analysis of multicategory items. The illustration given above of the calculation of the GBR used only binary data. In parts of the study, however, as in the Aston studies, some scales had multiple response categories. The method of dealing with such responses followed that used by Newberry (1971) which was based on Coombs' (1964:229-236) discussion of multicategory items. The method treats each category of a multicategory item cumulatively so that, for example, in an item with four possible responses (1, 2, 3, 4), a school which selects response 3 is assumed also to have scored on responses 1 and 2. In the item analysis each possible response is treated as an item and a GBR is calculated for it. This results in a very large matrix of items in cases where several multicategory items are present. In the analysis of the Concentration of Authority instrument, for example, each of the thirty items on the original set of questions had seven possible responses which yielded 210 "items" for which a GBR was calculated.

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[13] Several thousand GBR values were calculated in this study. The 70 items retained in the final analysis of all variables required the calculation of 234 GBR values of which 7 were lower than 0.40. In each case the decision to accept an item with a low value was justified by the results of the other tests of internal consistency in addition to the criterion of conceptual relevance noted above.

The decision rule for acceptance or rejection of an item was the same for multicategory items as for binary items. If one category had a low coefficient the whole multicategory item was rejected, with the exceptions noted above.

Non-discriminating items and the calculation of the mean GBR. Any item which is scored uniformly 1 or 0 by all members of the sample will have a GBR of 1.0. Although, in general such items were removed from the analysis since they did not discriminate among schools, there were two situations where their retention was necessary. First, in the analysis of multicategory items, the cumulative scoring described above meant that the lower categories in any item were frequently endorsed by all schools (as, for example, in the case where the range of scores on an item with four response categories was from 2 to 4, which would result in all schools receiving a score on categories 1 and 2). Second, in both binary and multicategory items an item which discriminated well in the whole sample and one of the sub-samples was sometimes scored uniformly in the other sub-sample. Where either of these situations arose the mean GBR would be spuriously inflated by these non-discriminating items. This difficulty was overcome by not using the non-discriminating items in the calculation of the mean GBR for the particular set of items or the particular sub-sample in which they occurred.

Further Tests of Internal Consistency

Item analysis enables the selection of a set of items which approximate a Guttman scale. In making this point, however, Levy and Pugh (1969:201-203) acknowledge the point made by other critics (e.g., Guttman, 1950:184) that it does not necessarily establish the unidimensionality of a set of items to the same extent as does scalogram analysis. They have suggested (1969:203) that ". . . data generated by the joint operation of several factors can still have a strong quasi-unidimensional core which may serve as a first-step summary of the data," but the Aston studies do, nevertheless, go beyond item analysis and use factor analytic and multiple regression techniques to confirm that their sets of items are unidimensional.

In the present study the use of factor analysis was held to be inappropriate because of the small sample and sub-sample sizes, both absolutely and in relation to the number of items under study. Nevertheless, some test of unidimensionality was necessary to complement the item analysis, and this was particularly so in the case of the items measuring Diversification of Workflow, whose basic unidimensionality, unlike that of the items used in the adaptations from the Aston work, had not been demonstrated by previous studies. Two tests were used: a split-half reliability test and a particular application of Kendall's coefficient of concordance.

These tests use nonparametric statistics of rank correlations and the results are usually most meaningfully reported by reference to the level of probability at which the null hypothesis may be rejected in the population from which the sample is drawn. Although the present study was concerned with the construction of instruments rather than the testing of hypotheses, a null hypothesis was assumed for the purpose of these tests to the effect that: "No association exists between the ranks obtained on different items." In view of the small sample sizes and the lack of knowledge about the parameters of the population of items under study, the decision was made to reject the null hypothesis if the value of the relevant statistic reached the 0.10 level of probability.

The split-half reliability test. Items which form a scale in the Guttman sense will have a high coefficient of reproducibility. Guttman has shown (1950:277-311) that where reproducibility of a set of items is high, then the ranks obtained on those items by members of a sample must remain fairly stable when only some of the items are used. The correlation cannot be perfect because the number of ranks depends partly on the number of items being used, but a fairly high correlation between the ranks obtained on one half of the items and those obtained on the other is to be expected.

In this study a split-half reliability test was carried out on all sets of items isolated by item analysis. The statistic used was Spearman's rank correlation coefficient (rho) and no set of items was accepted which did not yield a satisfactory correlation between the ranks obtained on each set of half the items.

Kendall's coefficient of concordance. Kendall's coefficient of concordance (W) is a measure of the degree to which a given number of judges agree on the ranks they assign to a given number of individuals, or, in other words, of the concordance between the judgements. In the present study the coefficient was used in a first-step analysis of the fifty-one items in the Diversification of Workflow instrument.

This use of the coefficient appears to be unusual but seems a reasonable, if crude, nonparametric alternative to factor analysis. The logic of its use in this way assumes that each item is a judge and that the schools which have responded to the item are the individuals being ranked. Difficulties arise in the case of binary items, since they yield a maximum of only two ranks and the number of tied ranks is therefore likely to be disproportionately large. Most of the items in the Diversification of Workflow instrument, however, were multicategory items so that, although tied ranks existed, their number was not sufficient to impair the analysis.

The procedure followed was to select a combination of items which, either in the original conceptualization of the instrument or in terms of the observed scores, might be considered to be related, and to calculate the coefficient of concordance between them. Where a satisfactory significance level was not indicated, the items were not considered to form a homogeneous group and other combinations of items were tested. Although the number of possible combinations of fifty-one items is very large, visual inspection of the data helped in reducing the number of iterations which was necessary. When a set of items was found which were associated in terms of this analysis and whose concordance could not be improved by the addition of further items, they were further refined by the item analysis procedures described above and the coefficient of concordance was recalculated as a confirmation of this refining process before the items were subjected to a split-half reliability test.

Tests of the Relationships between Variables

The tests performed to establish the relationships between the variables fall into three categories: (1) tests of correlation between the different variables of Size, Structure and Technology, (2) tests of the differences in each variable between the three local systems, and (3) tests of the differences in each variable between the schools grouped by geographic location.

The correlation between variables of size, structure and technology.

The Spearman rank correlation coefficient (rho) was used to test the association between these variables. Following the argument presented above (pp. 74-76), the correlation between each variable and all others was tested both in the whole sample and in the different sub-samples. For the purpose of these tests a null hypothesis was assumed to the effect that: "No association exists in the population from which the samples were drawn between the variables studied." This null hypothesis was rejected if the value obtained for rho reached the

0.05 level of significance.

Tests of the difference between local systems. The Kruskal-Wallis one-way analysis of variance by ranks was used to test the null hypothesis that: "No difference exists in the average scores obtained on each variable of Size, Structure and Technology by the secondary schools in the three local systems under study." The null hypothesis was rejected if the test yielded a value of H which was significant at the 0.05 level.

Since the Kruskal-Wallis one-way analysis of variance tests for differences between samples with respect to averages, a further test, the Wald-Wolfowitz runs test, was applied to the data to test whether the scores differed in any other way. Since this test can be applied to only two samples at a time, the data were grouped successively in pairs by local system (EPSD/ESSD, EPSD/WRCC, ESSD/WRCC). The null hypothesis was rejected for any pair of local systems if the number of runs observed was sufficiently small to reach the 0.05 level of significance.

Tests of the difference between geographic location. Two tests were carried out on the data grouped by geographic location: the Mann-Whitney U test and the Wald-Wolfowitz runs test. The rationale for using two tests is similar to that used in the preceding section: one test (Mann-Whitney U) compares the groups as to whether their scores differ in central tendency, the other as to whether they differ in any way at all.

In both tests the null hypothesis that no difference exists between schools grouped by geographic location was rejected if the

Table 4

Summary of Statistical Tests and Decision Rules Used

	Test	Statistic	Data to which applied	Null hypothesis	Decision rule
Tests of Internal Consistency	a)Item analysis	GBR	Items measuring: Functional Specialization, Formalization of Role Definition, Concentration of Authority and Diversification of Workflow	--	Accept items as a homogeneous set if: a) Each item GBR ≥ 0.40 b) Mean GBR ≥ 0.63
	b)Split-half rank correlation	rho	as above	No association exists between the ranks on different items	Reject Ho if rho value significant at $p \leq 0.10$
	c)Kendall's coefficient of concordance	W	Items measuring Diversification of Workflow	as above	Reject Ho if W value significant at $p \leq 0.10$
Tests of Relationships between Variables	d)Spearman rank correlation coefficient	rho	Variables of size, structure and technology	No association exists between the variables studied	Reject Ho if rho value significant at $p \leq 0.05$
	e)Kruskal-Wallis 1-way analysis of variance	H	Above variables where schools grouped by local system	No difference exists in the average scores on each of the variables under study in the 3 local systems	Reject Ho if H value significant at $p \leq 0.05$
	f)Mann-Whitney U test	U	Above variables where schools grouped by geographic location	As above, but with "two geographic locations" replacing "three local systems"	Reject Ho if U value significant at $p \leq 0.05$
	g) Wald-Wolfowitz runs test	r(=runs)	As in e) and f) above	As e) and f) above, but with "of any kind" to replace "in the average scores"	Reject Ho if no. of runs small enough for significance at $p \leq 0.05$

relevant statistic reached the value required for significance at the 0.05 level of probability.

Chapter 5

CONSTRUCTION OF THE INSTRUMENTS

Sub-problem 1 was:

> To devise measures of school administrative and workflow structures by:
>
> a) Adapting the Aston measures of the administrative structure of organizations for use in schools, and
>
> b) Constructing an instrument which will measure a school's technology in terms of the diversification of its workflow.

The work relating to both parts of the sub-problem is reported in this chapter. The chapter is divided into four major sections, each describing the way one of the instruments measuring variables of structure and technology was built. Since individual items in the instruments may require explanation they are dealt with singly or in groups as they arise and are listed together as complete instruments in Appendix A, in which is also incorporated an indication of which items were retained following the refinements described in Chapter 6.

This appendix also includes the questions used to obtain data relevant to the other variables used in the study which were not measured by a set of homogeneous items but by the computation of various size and personnel ratios. A recapitulation at this point of the variables used and a statement of the way in which each was measured may serve as a useful way of fixing the description of instrument building in context and of clearly specifying which variables needed measurement by specially adapted or constructed instruments.

Table 5 summarizes this information. The three broad dimensions of Administrative Structure, Workflow Structure (or Technology) and Context are expansions of the two Aston dimensions of Structure and Context. Within these dimensions are seven major variables. Two of the contextual variables, Geographic Location and Local System, were controlled in the sampling. The contextual variable of Size was measured directly by a count of pupils enrolled, and one of the variables of Administrative Structure, Size of Supportive Component, by the computation of personnel ratios. The three remaining variables, Structuring of Activities, Concentration of Authority and Diversification of Workflow were measured by four specially adapted or constructed multi-item instruments.

Table 5

The Variables and Their Measurement

Dimension	Variable	Measured by
Administrative Structure	Structuring of Activities (1) Functional Specialization	Adapted multi-item instrument
	(2) Formalization of Role Definition	Adapted multi-item instrument
	Concentration of Authority (Autonomy)	Adapted multi-item instrument
	Size of Supportive Component	Personnel ratios
Workflow Structure (Technology)	Diversification of Workflow	New-built multi-item instrument
Context	Size	Pupil enrollment
	Local System	Controlled in sampling
	Geographic Location	Controlled in sampling

These four instruments were designed to measure Functional Specialization, Formalization of Role Definition, Concentration of Authority (which was scored in two ways, one to give an overall score of Concentration of Authority and one to give a measure of Autonomy) and Diversification of Workflow.

In the case of the first three the task of instrument-building was one of adaptation from the short form instruments developed in the Aston studies and reported by Inkson et al. (1970a:327-329). In the case of Diversification of Workflow it was one of building a new instrument based on the concept of technology discussed above in Chapter 3. Both in adaptation and in original construction the process was a three stage one. The first stage consisted in thought: the gaining of a thorough understanding of the purpose of the instrument and the devising of suitable items with which to fulfil that purpose. The second stage was one of revision as a result of further reflection and discussion with colleagues. The third stage was one of checking, by using the questions developed so far in four schools and revising the response categories where necessary. The items and response categories described in the following paragraphs are those which resulted from these three processes.

FUNCTIONAL SPECIALIZATION

Functional Specialization is a measure of the division of labour in an organization. It was measured in the original Aston instrument (Pugh et al., 1968) by a scale of sixteen items which remained unchanged in the Inkson et al. (1970a) abbreviated replication. The sixteen items each deal with one activity which was assumed in the

Aston studies to be present in all work organizations. What the Aston researchers asked was whether or not each of the sixteen activities was "specialized"-- i.e., performed by one or more persons full-time. (For each activity that was specialized in this sense the organization under study received a score of 1.) In both published reproductions of the instrument the items are in language appropriate to manufacturing organizations.

Problems in Adaptation

This brief statement of the nature of the Aston Functional Specialization instrument highlights the three main problems which arise when an attempt is made to use it in school organizations. First, how appropriate to schools is the language of manufacturing organizations? Second, can it be assumed that schools as work organizations will undertake all of the sixteen activities listed? Third, can specialization be defined as the performance of an activity by one or more persons full-time when many activities in schools are performed by staff who also have teaching responsibilities? These problems and the method used in dealing with them are discussed in the following paragraphs.

Using an appropriate language. In many cases the language of an instrument used in manufacturing organizations is not applicable to schools. This problem arose in the devising of items for all the instruments adapted from the Aston studies. Its attempted resolution was in each case based upon finding a form of words which as nearly as possible referred to the equivalent process, activity or document in a school setting. The equivalence of forms of words depends upon the equivalence of the concepts they are used to describe, so that the "translation" process was more a conceptual than a linguistic one. Throughout this chapter the translation of items is described by reference to the concepts underlying them.

The activities performed. The list of sixteen activities used in the Aston instrument is based on Bakke's (1959) conceptualization and purports to consist of activities which are found in all work organizations. Although some of them (e.g., legal and insurance activities) may be considered more likely to be present in school systems than in individual schools, the approach taken in this study was to include all sixteen of the activities on the assumption that schools are work organizations and that, therefore, the list of activities should be as appropriate here as it was in the Aston sample.

The definition of specialization. Since the sixteen activities by which specialization is measured exclude workflow activities, and since the work of most staff members in a school is directly centred on the workflow, it was assumed to be unlikely that the Aston criterion for classifying an activity as specialized would be applicable in schools. This assumption was confirmed both in the pilot application and in the study itself which showed that only caretaking, and in some cases, business staff performed one of the listed activities and no other activity.

Accordingly, it was necessary to change the criterion by which an activity would be judged to be specialized. The approach to this problem taken by Newberry (1971) and Heron (1972) in adapting the Aston work to college structures was to count an activity as specialized if it was performed by a staff member who spent at least half of his time on it. In schools, however, it frequently happens that many non-workflow activities may be performed as supernumerary duties by staff who have no particular time allocation for them, and whose judgement of how much time they spend on a particular activity would be at best an estimate. A new approach was therefore taken in the present study. This approach was to focus on delegation as the key component of division of labour.

Delegation, however, may occur in any of several ways. It may be on an ad hoc basis (such that when a job arises it is delegated to anyone who seems free and competent to do it, irrespective of who did it when it arose on a previous occasion); it may be permanent (such that a given task is always given to Mr. X); it may be specific (as, for example, when clear limits are given to the delegate); or non-specific (so that Mr. Y handles "that kind of thing"). Further, delegation may be extensive (so that many people receive delegated tasks) or intensive (so that a comparatively few people receive all the delegated tasks).

Since the Aston conceptualization of specialization refers to regularly performed, specifically delimited responsibilities, the kinds of delegation examined in this study excluded the ad hoc and non-specific delegations. In interviews respondents were asked to indicate which of the listed activities were specifically and exclusively delegated to one or more staff members.

Whether delegation is extensive or intensive introduces a different dimension. The case of intensive delegation implies that one delegate may receive many different delegated tasks. To the extent that he does receive several different tasks he may be argued to be less of a specialist than one who has only one delegated job. Following this argument, a school in which fifteen tasks are delegated to two people has a staff which is less specialized as regards non-workflow activities than a school in which the fifteen tasks are delegated to fifteen different people. To revert to the Aston terminology, the former school is less functionally specialized than the latter.

Since specialization in the Aston usage was redefined in this study in terms of delegation, and since delegation was conceived as having the two dimensions of specificity and extensiveness, it was not possible to retain the simple method of scoring Functional Specialization which was used in the Aston studies. The method adopted is described below.

Computing a score of Functional Specialization. Two elements of each of the sixteen activities were taken into account by the Aston researchers in scoring Functional Specialization. First whether or not the activity was performed, second whether or not it was specialized. Although their score appears to take into account only the second of these elements, the first is implicit in it both theoretically and empirically: theoretically since an activity which is not performed cannot be specialized, and empirically since most organizations performed most activities and thus a count of those specialized was in effect a ratio of specialized to performed activities.

In the present study it was necessary that the Functional Specialization score should take into account three elements: first, whether or not a given activity was performed, second, whether or not it was specifically delegated, and third, the extent to which delegation in the school was intensive or extensive.

The first of these elements was measured by a count of the number of the activities which were performed in the school, and the second by a count of the number which were specifically and exclusively delegated. In computing the third element a figure was obtained for each school which showed the total number of different people or groups to whom tasks were delegated. Thus a school in which tasks A, B, C and D were all delegated might indicate that task A was delegated to Mr. X. tasks B and C to Committee P and task D to Mr. X. Such a school would be regarded as having two different delegates, Mr. X. and Committee P.

There are several methods of combining these three elements mathematically so as to yield a single score to represent a school's degree of Functional Specialization. In order to choose between them it is necessary to consider that two schools may achieve the same degree of specialization in different ways, since a specialization score is a statement about the proportion of activities performed, delegated activities and number of delegates. A simple addition of the numbers of each element, for example, would ignore the proportions between them and overemphasize larger numbers.

The point is best made by an illustration. Table 6 shows hypothetical data about two groups of schools and the results of different ways of computing a score of Functional Specialization. Columns II, III and IV show respectively for each school the number of activities performed (i), the number of these activities which are delegated (a), and the number of different delegates (b). The first group of schools (Schools 1-7) are listed in order of the decreasing proportion of delegated activities. The second group (Schools 8-10)

Table 6

Hypothetical Data To Illustrate the Results of Different Formulae for the Computation of a Functional Specialization Score

I	II	III	IV	V			VI			VII			VIII			IX		
School ID	No. of activities performed	No. of activities delegated	No. of different delegates	b.a.i			$\frac{b^2}{ai}$			$\frac{ai}{b}$			$\frac{a}{bi}$			$\frac{ab}{i}$		
					Ranks			Ranks			Ranks			Ranks			Ranks	
				Score	1-7	1-10	Score	1-7	1-10	Score	1-7	1-10	Score	1-7	1-10	Score	1-7	1-10
1	20	20	20	8000	1	1	1.00	1	1	20	5.5	8.5	0.05	5.5	8.5	20	1	1
2	20	15	15	4500	2	2	0.75	2	2	20	5.5	8.5	0.05	5.5	8.5	11.25	2	2
3	20	15	10	3000	3	4	0.33	3	3	30	3	5	0.075	3	5	7.5	3	3
4	20	10	10	2000	4	5	0.50	4	4	20	5.5	8.5	0.05	5.5	8.5	5.0	4	4
5	20	10	5	1000	5	7	0.125	6	6.5	40	2	4	0.10	2	3	2.5	5	7
6	20	5	5	500	6	8	0.25	5	9	20	5.5	8.5	0.05	5.5	8.5	1.25	6	9
7	20	5	2	200	7	10	0.04	7	10	50	1	2	0.125	1	2	0.50	7	10
8	24	12	6	1728		6	0.125		6.5	48		3	0.083		4	3.0		6
9	12	6	3	216		9	0.125		6.5	24		6	0.166		1	1.5		8
10	32	16	8	4096		3	0.125		6.5	64		1	0.063		6	4.0		5

Note: The symbols used in columns V-IX are as follows:
i = Number of activities performed
a = Number of activities delegated
b = Number of different delegates

all have the same proportion of delegated activities and these activities are delegated equally intensively in that there are half as many delegates as there are delegated tasks. Using the symbols i, a, b, defined above, columns V, VI, VII, VIII and IX of the table show the scores and ranks which would be assigned to each of the first seven schools considered as a group if Functional Specialization were calculated in any one of five different ways. The columns also show the rankings obtained when all ten schools are combined as one group.

Merely on the basis of a first inspection of the scores in columns II, III and IV it is clear that School 1 is more specialized than any other since all activities which are performed are delegated and each delegation is to a different person. It is equally clear that School 7 is the least specialized since only one quarter of its performed activities are delegated and these to only two delegates. The fact that the computations shown in columns VII and VIII reverse these orderings is grounds for their rejection. When the results of the remaining three formulae (b.a.i, $b^2 + ai$, $ab + i$) are examined it is noticeable that all three yield similar ranks. If only the first seven schools are ranked the rankings yielded by (b.a.i) and ($ab + i$) are identical and those yielded by ($b^2 + ai$) differ only in that the rankings given to Schools 5 and 6 are reversed.

When the three schools of the second group are added to those of the first group the differences in the results yielded by the three formulae become clearer. The salient feature of these last three schools is that they all delegate the same proportion of performed activities and they all delegate on the basis of two tasks per delegate. They are arguably, therefore, equally specialized in their internal operation. Only the formula $(b^2 \div ai)$ yields identical scores for these schools and for School 5 which has the same proportionate distribution between the three elements. The formula $(ab \div i)$ differentiates between these schools on the basis of the number of activities performed, although it places the four as a group in the same area of the distribution as does $(b^2 \div ai)$. The formula $(b.a.i)$ appears to differentiate between the schools more in terms of the number of tasks performed and delegated than of the number of delegates.

In the present study the formula $(b^2 \div ai)$ was selected for the computation of the Functional Specialization score. Since this formula has a maximum value of 1.00 the results of the computation were multiplied by 100 to avoid the necessity of dealing with fractional values. The formula expresses the degree of specialization as a function of two things: the ratio of delegates to delegated tasks $(b \div a)$ and the ratio of delegates to activities performed $(b \div i)$. In that this formula gives more weight than the others to the number of different delegates, it was felt to be the most appropriate to the basic conceptualization of Functional Specialization as a measure of an organization's division of labour. As a check on the results given by this formula, however, the formula $(b.a.i)$ was also used to compute an alternative set of Functional Specialization scores.

Adapting the Content of the Instrument

Inkson et al. (1970a:327) give the complete list of activities, each of which forms one item in their scale of Functional Specialization. This list is reproduced below and shows in parenthesis after each item the Inkson et al. translation into terms suitable for use in commercial or manufacturing organizations:

1. Develop, legitimize and symbolize the organization's charter (public relations, advertizing, etc.)
2. Dispose of, distribute and service the output (sales and service, customer complaints, etc.)
3. Carry outputs and resources from place to place (transport)
4. Acquire and allocate human resources (employment, etc.)
5. Develop and transform human resources (education and training)
6. Maintain human resources and promote their identification with the organization (welfare, medical, safety, magazine, sports and social, etc.)
7. Obtain and control materials and equipment (buying, material control, stores, stock control, etc.)
8. Maintain and erect buildings and equipment (maintenance, works engineer, etc.)
9. Record and control financial resources (accounts, costs, wages, etc.)
10. Control the workflow (planning, progressing, etc.)
11. Control the quality of materials, equipment and outputs (inspection, testing, etc.)
12. Assess and devise ways of producing the output (work study, O.R., rate-fixing, methods study, etc.)
13. Devise new outputs, equipment and processes
14. Develop and operate administrative procedures (registry, filing, statistics, O and M)
15. Deal with the legal and insurance requirements (legal, registrar, insurance, licensing, etc.)
16. Acquire information on the operational field (market research).

In its simplest terms the task of adapting the content of the instrument was to find school equivalents for each of the sixteen sets of parentheses in the list above. Since few, if any, studies have attempted a detailed classification of school activities in terms of their analogy with those found in industrial organizations, there could be no certainty that a complete list of equivalents was being drawn up. Accordingly, where several school functions seemed to belong to the same kind of activity they were all incorporated. This resulted in a list of forty items held to represent the sixteen activities. The refinement of these forty items by item analysis is described in Chapter 6, but for use in the data collection schedule the items were developed as described below.

Activity #1. (Develop, legitimize and symbolize the organization's charter.) While there may be little doubt that schools perform this activity, it also seems true that a great many of the activities used in a school to build its image as a corporate, purposive entity are performed in the workflow and may, in fact, be seen as either a control mechanism (inculcating a school spirit) or an aspect of the educational process (instilling values of corporateness and loyalty to the institution). To view this first activity in terms of public relations and advertizing as in the Aston studies, is to focus on its nature as a link between the organization and the outside world. In accordance with this view six items were used to represent this activity:

Item 1. Arranging appeals, fund-raising functions, publicity, etc.

Item 2. Arranging ceremonies for parents or students.

Item 3. Administering or acting as school liaison officer for an alumni or former pupils' association.

Item 4. Producing a school magazine.

Item 5 Producing a school yearbook.

Item 6. Producing a school newspaper.

Activity #2. (Dispose of, distribute and service the output.) Given the view of technology in schools outlined earlier (Chapter 3, pp. 56-59), the output of the organization can be seen as people (students) who have received an education. Disposing of this output and distributing it seem most appropriately translated in terms of providing employment guidance for students. "Servicing" the output is a process which scarcely seems to exist in the school setting, but in that the servicing provided by a manufacturer is partly a response to customer reaction to the product, and to the extent that parents and taxpayers may be seen as customers, the school may be seen as having a kind of servicing function in its dealing with complaints from the outside world.

Three items were used to operationalize these ideas:

Item 7. Co-ordinating the presentation of careers advice to students.

Item 8. Liaison with employers or institutions of further education.

Item 9. Receiving or dealing with parent or community complaints.

Activity #3. (Carrying outputs and resources from place to place.) The output of a school organization is clearly not transported by the organization. Resources, however, may be--within the school plant--and schools are frequently involved in the movement of students to static resources. Three items were used in this connection:

Item 10. Co-ordinating school bus requirements.

Item 11. Co-ordinating transportation for field trips or outside visits.

Item 13. Operating an in-school delivery system for internal mail, equipment or supplies.

Activity #4. (Acquire and allocate human resources.) Three items were used to represent this activity:

Item 13. Hiring teaching staff.

Item 14. Hiring non-teaching staff.

Item 15. Allocating staff to broad areas of work (e.g., departments).

Activity #5. (Develop and transform human resources.) When adapted to the school situation this activity became:

Item 16. Co-ordination of in-service training or staff discussion groups other than departmental meetings.

Activity #6. (Maintain human resources and promote their identification with the organization.) Staff welfare activities may be included in this category in schools as well as in industrial organizations. To the extent that certain other facilities, provided primarily for students, also serve staff interests, they too may legitimately be included. Five items were used:

Item 17. Co-ordination of staff welfare, social or sports activities.

Item 18. Operating canteen or cafeteria facilities.

Item 19. Operating a suggestion scheme.

Item 20. Operating the sale of books or stationery.

Item 21. Operating medical facilities.

Activity #7. (Obtain and control materials and equipment.) There appears at first sight to be little difficulty in using this item as it stands in a school setting. However, since students were held to be raw materials it was felt that this category of activity should include some reference to the "obtaining and controlling" of students. This was attempted by the third of three items:

Item 22. Buying materials and equipment.

Item 23. Stock control.

Item 24. Selection or pre-testing of students.

Activity #8. (Maintain and erect buildings and equipment.) Since the erection of buildings in the school setting is typically not the responsibility of the school organization itself, the four items selected to represent this activity all focussed on the maintenance function:

Item 25. Operating caretaking services.

Item 26. Maintenance of A-V equipment.

Item 27. Maintenance of laboratory equipment.

Item 28. Maintenance of general school building equipment.

Activity #9. (Record and control financial resources.) One item was used:

Item 29. Performing business or accounting functions.

Activity #10. (Control the workflow.) The workflow in a school is typically structured by means of the time table. Discipline procedures may also be regarded as belonging in this category in that they serve partly to control the movement and behaviour of students during the day to day processes of the school. Two items reflected this interpretation:

Item 30. Time tabling and curriculum co-ordination.

Item 31. Drawing up and/or co-ordinating overall discipline procedures.

Activity #11. (Control the quality of materials, equipment and outputs.) Control of the quality of equipment, to the extent that it is exercised in schools, seems to be a part of activity #7 above. The control of the quality of materials and outputs was interpreted (following the Aston usage of "inspection, testing, etc.") as being manifest in those activities directed towards checking standards of achievement and implementing whatever criteria may be used for the advancement of students through the school. Three items were used:

Item 32. Co-ordinating student advancement, from grade to grade or from one level to the next senior level.

Item 33. Preparing examination schedules.

Item 34. Making arrangements for seating and space allocation for examinations.

Activity #12. (Assess and devise ways of producing the output.)

Activity #13. (Devise new outputs, equipment and processes.) These two activities seem closely related and were translated by using one item for each:

Item 35. Devising or assessing new ways of time tabling existing courses or programs.

Item 36. Designing ways of incorporating new courses or programs or co-ordinating suggestions in this area.

Activity #14. (Develop and operate administrative procedures.) The use of the word "administrative" in this item gives it a breadth which is misleading until the Aston interpretation ("registry, filing, statistics, O and M") is considered. Originally the adaptation of this activity was in the form of one item. Responses gained during the pilot application of the instrument led to the formulation of two items:

Item 37. Operating record keeping or filing systems for student records.

Item 38. Operating record keeping or filing systems for office or administrative purposes.

Activity #15. (Deal with the legal and insurance requirements.) This activity was virtually unchanged:

Item 39. Handling legal or insurance affairs.

Activity #16. (Acquire information on the operational field.) The interpretation of this item was helped by reference to the Aston usage of "market research." Following the argument advanced under activity #2 above, one item was used to represent this activity:

Item 40. Researching or assessing the needs of employers, the community, or institutions of further education, and their likely effect on school policy or operation.

FORMALIZATION OF ROLE DEFINITION

Formalization of Role Definition is a measure of ". . . the extent to which rules, procedures, instructions and communications are written" (Pugh et al., 1968:75). The instrument used in the original Aston studies was slightly revised by the omission of one item in the abbreviated version given by Inkson et al. (1970a:328) which was the basis for the adaptation made here. The instrument assesses the number of specific role defining documents, from a set list, which exist in an organization and also, in some cases, the extent of their distribution. Most of the items in the Aston instrument are less specific to manufacturing organizations than is the case with the Functional Specialization instrument, but some problems of adaptation to schools do, nevertheless, exist.

Problems in Adaptation

Three problems may be isolated as needing consideration: first, the need to find an appropriate set of terms; second, the question of whether the list of documents presented is as complete in the school setting as it is in the manufacturing setting; and third, the problem of how to consider role defining documents which originate outside the school organization.

Using an appropriate language. In this instrument the problem of an appropriate language is less in the description of the documents than in the description of the levels of the organization at which they might be distributed. Of some help here were the guidelines suggested by Pugh et al. (1968:77) who give examples of the titles used for different hierarchical levels in different kinds of organization. According to their equation the teacher is the direct worker and the chief education officer (or superintendent in the Canadian setting) is the equivalent of the managing director of the whole organization. Since, in the present study, the school and not the school system was regarded as the organization, the principal or headmaster was regarded as the chief executive officer and the other levels were seen in descending order as: assistant principal or deputy headmaster and heads of school, department head or housemaster, teacher.[14]

An adequate list of documents. In general the Aston list of documents was felt to be adequate for use in a school setting. However, the pilot application revealed that the last Aston item ("written research program or reports") was not commonly endorsed in schools, and that other documents frequently existed which were not covered by the Aston list. The procedure followed was to add these documents to the list and subsequently confirm the suitability of each of the additions by item analysis of the responses.

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[14] Appendix B shows the different hierarchical levels of staff in West Riding and Alberta schools.

Extra-organizational documents. Although the school was viewed in this study as an organization in itself, its status as a member of a larger organized system--the local school system--is an undeniable part of the reality of publicly funded educational institutions. Also part of this reality is the presence, to a greater or lesser degree, of role defining documents which originate in the central office of the local system and which may specifically define roles of staff in the school itself. Since schools also produce their own role defining documents, the question arises of how to consider documents originating from each source in terms of the measurement they give of the degree of formalization present in any particular school. To consider only the school's own documents, for example, may, in a given school, yield a very low score on Formalization of Role Definition for a school whose staff members take roles which are, in fact, very tightly specified by a central office administration.

To overcome this problem the interview schedule was designed so that, for each document, it could be ascertained whether it originated in the school system or the school, or whether a given document was produced by both sources. The problem of which documents to use in deriving a score for each school was solved only after item analysis, but the method of data collection allowed for the alternative procedures of ignoring one set of documents, using both, or weighting them differentially.

Adapting the Content of the Instrument

The Aston short form instrument is given below and incorporates the details of scoring for each item.

Item		Score
1. Information booklets given to:	None	0
	Few employees	1
	Many employees	2
	All employees	3
2. Number of information booklets:	None	0
	One	1
	Two	2
	Three	3
	Four or more	4
3. Organization chart given to:	None	0
	Chief executive only	1
	Chief + one other executive	2
	Chief executive + all/ most department heads	3
4. Written operating instructions:		1
5. Written terms of reference or job descriptions:	For direct workers	1
	For line superordinates	1
	For staff (other than line superordinates)	1
	For chief executive	1
6. Manual of procedures:		1
7. Written policies:		1
8. Workflow (production) schedule or program:		1
9. Written research program or reports:		1

In the present study changes were made in the titles of various office holders and some amplification was given to document titles. Items 4 and 5 of the Aston instrument were combined. Item 9 was changed and incorporated with six other items which were added for reasons given above (p. 110) and which referred to documents commonly originated by schools. These items, together with the revised item 9 became items 8 to 14 in the adapted version which thus consisted of fourteen items and is shown in full in Appendix A. These fourteen items yielded initially twenty-one individual item scores since the first seven items were each scored twice, once for system documents and once for school documents.

CONCENTRATION OF AUTHORITY

Concentration of Authority describes the levels at which formal authority rests (Inkson et al., 1970a:320). The abbreviated Aston instrument uses twenty-three items from the original Aston measure of Centralization. The Aston studies measure the variable by asking, for each of a set of decisions, who has the authority to make the decision and by scoring the responses according to the level of organization at which the decision can legitimately be made. Six levels are identified in the Aston work and scored on a scale of 0 to 5. This method of scoring enables the data to be used two ways: a total score can be obtained for any organization and this score will be, in essence, an indication of the average level of decision-making in that organization; alternatively, by dichotomizing the responses (into those which score at a level within the organization and those which score at a level above that of chief executive officer) a score can be obtained which is an indication of the degree of Autonomy, or lack of Autonomy, enjoyed by the organization. In the abbreviated Aston study the latter of these approaches was used and only the lack of Autonomy of an organization was measured.

Problems in Adaptation

The problem common to all the adaptations of the Aston instruments--that of finding an appropriate language--has been described above as a conceptual rather than a linguistic problem. In the case of adapting the Concentration of Authority instrument it is essentially the only problem, but it is one with three aspects. These aspects concern (a) the rubric which precedes the items, (b) the equivalence of hierarchical levels and the scoring of responses and (c) the wording of the items.

Wording the rubric. The rubric which precedes the individual items in the Aston work (Pugh et al., 1968:76) asks: " Who is the last person whose assent must be obtained before legitimate action is taken--even if others have subsequently to confirm the decision?" For the pilot study the question was used in precisely this form. However, during these pilot interviews it became apparent that, although the question seemed unambiguous, principals were uncomfortable with it. They commonly described situations in which, for all practical purposes, action could follow their decision on a particular matter, but in which it was occasionally possible for their decision not to be endorsed by a higher authority.

When the responses to the pilot interviews were analyzed together an indication emerged that a crucial distinction existed between three kinds of "decision." First was the decision which was quite plainly a decision--following it action could immediately be taken with no fear of the decision's being reversed because the decision maker was legitimately authorized to make it. This was the kind of decision with which the Aston studies were concerned and which was being examined in the present study. The identification of such decisions, however, was clouded by the existence of two other kinds: those in which a principal, for example, could make a recommendation with some (but not complete) certainty of its subsequent ratification, and those in which he could recommend with complete certainty of ratification.

While rationally these two kinds of decision are not decisions at all in the Aston sense, their existence made interviews difficult because they could, in certain cases and by different people, be considered to be decisions. As a result a great deal of time could have been spent in an interview establishing for each item exactly what the respondent meant when he said that a certain decision was taken at a certain level. To overcome this difficulty the rubric was rephrased in order to highlight the difference between each of these kinds of decision and the following introduction to the Concentration of Authority items was used:

> The question "Who decides such and such . . .?" often is not easy to answer in clear cut terms. To try and get an accurate picture of the situation in the school, I am proposing that for any given decision a person may have one of three different kinds of authority:
>
> 1. He may recommend and hope for a favourable decision
> 2. He may recommend and be certain of a favourable decision (RC)
> 3. He may decide. That is, as a result of his decision action may start immediately. Others may have to be informed of his decision, but the decision will not be affected. (D)

> I shall present a list of decisions. Could you tell me, for each one, who makes that decision? Please indicate whether the making of the decision is in the category (RC) or (D) above. In the case of (RC) answers it would help if you could indicate who has the authority for (D).

An unlooked for advantage emerged from this procedure in that respondents found it easy to give answers in terms of both recommending with certainty and deciding. This information--superfluous to the design of the study--gave interesting insights into the relationships between formal and practised levels of decision-making.

Equating hierarchical levels. Pugh et al. (1968:77) specify the hierarchical levels in a local education department as: 0 - teacher, 1 - head of department, 2 - headmaster, 3 - assistant education officer, 4 - chief education officer, 5 - city council. These terms refer to the English setting and are not directly translatable into Alberta terms. Even in the English setting, however, the classification seems somewhat coarse when applied to secondary schools.

Appendix B shows the hierarchical levels in the West Riding and Alberta school systems. Examination of these levels shows two important ones which are omitted from the Aston list. The provincial government of Alberta plays a considerable role in financial allocations and curriculum determination. The lay board of governors of each West Riding comprehensive school (as of all British secondary schools) is responsible for guiding the work of the school.[15] In order to incorporate these levels into the scheme of decision-making levels a seven-point classification scheme was used to replace the Aston six-point scheme Respondents were asked to classify decisions according as to whether they were made at the following levels:

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[15] The responsibilities of the board of governors are clearly laid out in the Articles of Government (County Council of the West Riding of Yorkshire, 1951).

0 Teacher

1 Department head or assistant principal/deputy head

2 Principal/headmaster

3 Board of governors

4 Superintendent/chief education officer or central office personnel delegated by him

5 School board/local education authority

6 Government department or other provincial or national body

The scoring of responses. When the instrument was used to obtain a school's average level of decision-making there was no difficulty in scoring the responses. Each item was assigned the appropriate score from the list given in the preceding section. When the instrument was used to obtain a school's Autonomy score, however, the question arose of whether a decision made by a West Riding board of governors (category 3 which does not exist in Alberta) was an in-school decision or not. In one way the board of governors may be considered an integral part of the school, since it is concerned exclusively with matters relating to the internal operation of the school.

The decision was taken to use the responses to create two Autonomy scores, the first being the number of decisions taken at or below the level of headmaster or principal, the second being the number of decisions taken at or below the level of the board of governors. In making this decision it was accepted that the most meaningful comparisons would probably result from examining the first of these scores and would focus on a much-discussed topic in the field of education--that of teacher autonomy.

The wording of items. Where difficulties of translation arose they were resolved by using the conceptualizations on which this study was based and whose use has already been shown in the description of the way the Functional Specialization instrument was adapted.

Adapting the Content of the Instrument

The twenty-three items in the short form Aston instrument became thirty-one items in the present study. Most of the additions resulted from the need to refine the Aston term "supervisors" by distinguishing between assistant principals and department heads in some items, and from the inclusion of certain staffing decisions relating to teachers where it seemed appropriate. The following details of the content adaptation are ordered in terms of the Aston list of decisions and the total list was preceded by the words, "Who decides?"

Aston #1. (Supervisory establishment.) This was expanded to three items:

1. The number of assistant principals in the school.
2. The number of department heads in the school.
3. The number of teachers in the school.

Aston #2 and Aston #3. (Appointment of supervisory staff from outside the organization, and promotion of supervisory staff.) These items were combined and interpreted by four items which took into account the fact that promotions and appointments in schools are typically not dichotomized into "inside" and "outside," and that where an insider is appointed or promoted to a supervisory position, he very frequently receives the appointment after a selection which considers him with outside contenders. The four items were:

4. The appointment of an assistant principal.

5. The appointment of a department head.

6. The appointment of a teacher.

7. The promotion of staff within the school.

Aston #4. (Salaries of supervisory staff.) These salaries in schools usually consist of two elements: the person's salary as a teacher and an extra allowance. Hence two items were worded:

8. The amount of the allowance of assistant principals over and above their teacher salary.

9. The amount of the allowance of department heads over and above their teacher salary.

Aston #5 and Aston #6. (To spend unbudgeted or unallocated money on capital items, and to spend unbudgeted or unallocated money on revenue items.) In these two items the Aston wording was retained and they became items 10 and 11 in the adapted instrument. Since school budgets are typically set by the local system administration, respondents were instructed to answer in terms of funds over which the school had discretion.

Aston #7. (What type or brand new equipment is to be.) This item was retained unchanged as item 12 in the adaptation.

Aston #8. (To determine a new product or service.) This was translated by two items:

13. The introduction of a new course or subject.

14. The introduction of a new program.

Aston #9 and Aston #10. (To determine marketing territories covered, and to determine the extent and type of market to be aimed for.) The difficulty of translating the term "market" was resolved in the adaptation of the Functional Specialization instrument by using two concepts. One was that of parents and community as "customers" and the other was that of employers and institutions of further education as consumers of the product. These concepts were used in this instrument and the Aston items 9 and 10 were adapted to become:

15. The boundaries of the attendance area.

16. Which employment or further education opportunities shall be presented to students.

Aston #11 and Aston #12. (What shall be costed, and what shall be inspected.) Costing is a process common to both manufacturing and educational organizations. Inspection (c.f., the discussion of Functional Specialization above (p. 107) can be viewed as a general quality control mechanism. The wording of the Aston item #11 was amplified and of Aston item #12 changed so that they became:

17. What items or processes shall be costed.

18. What aspects of the school's operation shall be evaluated.

Aston #13. (What operations shall be work-studied.) Work study is an activity which was assumed not to take place in schools. This assumption was confirmed by the pilot interviews and accordingly this item was omitted from the adapted instrument.

Aston #14. (To dismiss a supervisor.) Since assistant principals and department heads are also teachers, dismissal was taken to include demotion (i.e., dismissal from the office of supervisor). Three items were used:

19. To dismiss or demote an assistant principal.

20. To dismiss or demote a department head.

21. To dismiss a teacher.

Aston #15. (Training methods to be used.) This item became:

22. The methods of training or help for new staff.

Aston #16. (Buying procedures.) Buying was taken to refer to the acquisition of raw materials and the item was accordingly translated as:

23. Entrance or selection procedures for new students at the beginning of the school year.

Aston #17. (Which suppliers of materials are to be used.) Following the interpretation used above this item became:

24. Which feeder schools shall provide new students.

Aston #18. (What and how many welfare facilities are to be provided.) Apart from the insertion of the word "staff" before the word "welfare" this item was unchanged and became item 25 in the adapted instrument.

Aston #19. (The price of the output.) At first sight this item seems inapplicable, but following the interpretation of "customers" as parents or community, the following translation was used in the adaptation:

26. The costs to parents of books, uniform, sundries.

Aston #20 and Aston #21. (To alter responsibilities/areas of work of specialist department, and to alter responsibilities/areas of work of line departments.) The view of specialization taken in this study precluded the use of these items in this form. Instead, a distinction was made between the work of teaching and non-teaching staff. As a result of the pilot application a further distinction was made within the category of non-teaching staff which separated caretaking staff. Three items were used:

27. To alter the responsibilities or area of work of teaching staff.
28. And of non-teaching staff, excluding caretakers.
29. And of caretakers.

Aston #22 and Aston #23. (To create a new department, and to create a new job.) These two items were used unchanged and became items 30 and 31 of the adapted instrument.

DIVERSIFICATION OF WORKFLOW

The conceptual basis for this instrument has been described above (pp. 56-59). The definitions already given (p. 62) of "Technology," "Workflow" and "Diversification of Workflow" are all relevant and the purpose of the instrument may be described as that of assessing the degree to which a school's technology is diversified.

The set of questions developed for this purpose constituted a first attempt to come to grips with the measurement of technology in school organizations. Two problems were of prime concern: first, the conceptualization of the dimensions involved and second, the construction of items and response categories each of which accurately reflected a hypothesized continuum of diversification. The solution of the first of these problems has already been described (p. 57). The solution of the second was partly a matter of conceptualization and partly a matter of empirical refinement as a result of the pilot application.

The construction of the items and response categories was essentially an attempt to operationalize a set of assumptions about what takes place in a diversified school. In the following paragraphs the description of the development of the instrument is ordered in terms of the different elements of Equipping, Placement of Raw Materials, Sequencing, Control, Scope and Evaluation and Reporting, and for each of these elements a statement of the assumptions precedes the description of each of the items designed to operationalize them. In the interview schedule as it was used in data collection (Appendix A) certain data were obtained from supplementary sheets and were not assigned a question number. The numbering in the text below refers to item numbers and not question numbers.

Equipping the Workflow

A school whose workflow is equipped for diversification will have a wide variety of equipment, both fixed and portable. Specifically:

(a) A large number of teaching areas will be available and this will be reflected in a low ratio of pupils per teaching area

(b) There will be ample provision of rooms with fixed, specialist equipment .

(c) A large number of items of audio-visual equipment will be held

(d) There will be a wide variety of audio-visual equipment

(e) One particular type of diversification may be reflected in the number of pieces of audio-visual equipment designed for individual study, and

(f) There will be a substantial provision of duplicating equipment available for the preparation of class materials.

In attempting to assess the provision of each of these features a direct quantitative count of pieces of equipment is meaningless unless it is considered in relation to various other factors. Usually these factors are size factors--numbers of pupils, numbers of teachers-- and comparisons are best made by the calculation of ratios or percentages. The following items and ways of scoring them were incorporated into the instrument.

Item 1. Teaching space. By teaching space was meant any area in which teaching was carried out. Specific reference to rooms was avoided because of the provision in some newer school buildings of large areas designed to house several different teaching groups, and also because of the desirability of considering local variations in use of space--for example, the regular teaching of a small class at one end of a hallway where insufficient or unsuitable space was available elsewhere. The instructions to the respondent were to exclude outdoor areas where an occasional class may be held in fine weather.

Respondents were asked to indicate the total number of teaching areas available and the score for each school was calculated as the number of teaching areas per pupil--a fractional value which was multiplied by 100 for convenience.

Item 2. Fixed, specialist equipment. Fixed, specialist equipment was defined as equipment which is designed to assist in the teaching of specialist subjects and which is not portable in that it cannot be moved to a different location without the expenditure of time and money or expert labour. A school was judged more diversified in its equipment to the extent that it possessed items of fixed, specialist equipment. The score on this item was the number of teaching areas possessing such equipment expressed as a percentage of the total number of teaching areas.

Items 3 to 9. Audio-visual equipment. Respondents were asked for an inventory of current holdings of audio-visual equipment. Diversification was held to be a function of the number of pieces of such equipment, the number of kinds of such equipment, the number of functions it could perform and its availability in terms of the number of teachers among whom it was shared. A further dimension of diversification was added by assessing the degree of provision of pieces of audio-visual equipment which could be used by students for individual study.

These alternative ways of examining the inventory yielded seven items. The first three considered the school's total holdings, the next three broke down these holdings in terms of the functions which each piece of equipment performed, and the seventh isolated those pieces of equipment which could be used for individual study.

Item 3 considered total holdings of audio-visual equipment in terms of the number of pieces held and the number of functions which could be performed. To obtain the second of these elements, nine possible functions were isolated which resulted from defining three functional categories and three sub-categories within each category.

The three categories were those of (1) SOUND, (2) VISION and (3) SOUND AND VISION. Within each of these categories equipment may be designed (a) to record, (b) to play, or (c) to record and play. Thus a school which possessed ten overhead projectors (VISION--play), three reel to reel tape recorders (SOUND--record and play), five cassette tape recorders (SOUND--record and play) and two 16mm film projectors (SOUND AND VISION--play) would have twenty pieces of equipment which could perform three of the possible nine functions. The score for item three was the product of the number of pieces and the number of functions, so that, in the hypothetical case above, the score would be 60.

Item 4 considered total holdings of audio-visual equipment in terms of the number of pieces of equipment and the number of different kinds. The score was expressed as the number of pieces divided by the number of kinds. The difference between items 3 and 4 can be seen by reference to the hypothetical school instanced above whose score on item 4 would be 20 (pieces) divided by 4 (kinds) equals 5.

Item 5 considered the availability of equipment in terms of the number of people among whom it was to be shared. The score was obtained by dividing the number of pieces of equipment by the number of teachers.

Item 6 considered only those pieces of equipment in the SOUND category described under item 3 above. For each of the sub-categories (record, play, record and play) a figure was obtained which was the quotient of the number of pieces divided by the number of kinds of equipment in that sub-category. The score for item 6 was the average of the three quotients.

Item 7 considered only those pieces of equipment in the VISION category described in item 3 above. The score was calculated in the same way as the score for item 6.

Item 8 considered only those pieces of equipment in the SOUND AND VISION category described in item 3 above. The score was calculated in the same way as the score for items 6 and 7.

Item 9 examined the provision of audio-visual equipment which could be used for individual study. Only those pieces of equipment which could be used in a small space were considered and, typically, they were such items as cassette tape recorders, cassette players and film strip previewers. The score was the number of such pieces of equipment expressed as a percentage of the total number of pieces of audio-visual equipment.

Items 10 and 10A. Duplicating equipment. Respondents were asked for an inventory of all holdings of duplicating equipment which was used for the preparation of class materials either by the teacher or by the secretarial staff. The more pieces of equipment a school possessed, the greater was taken to be its diversification. Scores were calculated both by a straight count of pieces (item 10) and by the number of pieces of equipment divided by the number of teachers (item 10A).

Placement of Raw Materials

Assuming the school's product to be educated ex-students and assuming students to be the raw materials with which the school works, the extent to which a school has diversified its placement of raw materials will depend upon the view taken of the raw materials. The raw materials may be seen as uniform, in which case there is no need for diversification in their placement, or they may be seen as non-uniform, in which case a sorting process must take place if the workflow and output are to be to any degree standardized.

A school whose placement procedures are diversified will reflect this in sorting pupils:

(a) By assigning pupils to program areas on the basis of some assessment of aptitude or ability in addition to the consideration of pupil choice, and

(b) By assigning pupils at any one stage of their education to different classes in the same subject on the basis of aptitude or ability.

A further assumption concerning placement is that a school in which placement procedures are diversified will:

(c) Allow a greater variation in teaching group sizes than will a school which is less diversified.

Three items were used to operationalize these statements.

Item 11. Placement in program area. Respondents were asked: Concerning the initial placement of students in program areas which of the following best describes the school's policy? Three response categories were as follows:

1. Free student choice
2. School direction based on some indication of ability and student choice
3. School direction based on some measure of ability

Item 12. Placement in group. Respondents were asked: Where there is more than one teaching group for a given subject how are students assigned to groups? Five response categories were used:

1. Random allocation
2. A mixture of random allocation and student choice
3. Student choice moderated by time table constraints
4. Student ability moderated by time table constraints
5. Student ability

Item 13. Teaching group size. The sizes of all teaching groups in the school were examined. The score was the standard deviation in sizes of teaching groups.[16]

Sequencing the Workflow

Two types of sequencing may be envisaged: daily and long term. Where a school's workflow is not diversified the daily sequencing of activities will follow the same pattern for all students: all will start school at the same time and there will be no variability in either the length of periods or in the times of day at which a given class is taught a given subject over the week. Thus schools may be examined for:

(a) Their daily opening arrangements

(b) The variability in their period length, and

(c) The variability in the starting and finishing times for a given subject in a given class over the week.

In the case of long term sequencing a student in a school with an undiversified workflow may have to revise his chosen areas of study to fit in with a fixed time table, and the times of year at which he may change or drop a course or program will be few. Schools may therefore be examined for:

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[16] See p.72 for details of the way the data for this item were collected in West Riding schools.

(d) The extent to which the time table forces students to change their plans, and

(e) The times of year at which permission may be given to change or drop courses or programs, and the frequency with which such permission is given.

These statements were operationalized by nine items.

Item 14. Daily opening. The question was in the form: What is the policy governing the time at which students arrive each day? Response categories were:

1. All students start school at the same time
2. Some students start at a regular time, others need not arrive until the time of their first class
3. No student needs to arrive until the time of his first class

Item 15. Period length. The time table in each school was examined and the lengths of different periods ascertained. The item was scored by specifying different period lengths as a, b, c, and scoring as follows:

0 All period lengths are a

1 Period lengths are a, 2a or a, b

2 Period lengths are a, 2a and higher multiples or a, 2a, b, 2b

3 Period lengths are a, b, c or a, 2a, b, 2b and higher multiples of a or b or combinations of a + b

4 Period lengths are a, 2a, b, 2b and higher multiples of both a and b or a, b, c and multiples of two of these

Item 16. Period start times. All subjects which were taught to a given class more than twice a week were analyzed in terms of the times at which they were scheduled. The score for this item was the average of a x b where: a = the number of occurrences of the subject and b = the number of these occurrences which started at a different time of day from the first occurrence.

Item 17. Student revision of choice of subjects. Respondents were asked: How frequently does it happen that a student has to revise his selection of courses because what he originally wanted to do is not possible under the existing time table? The five response categories were:

1. Frequently
2. Quite often
3. Not very often
4. Very seldom
5. Never

Items 18 and 19. Changing a course: dropping a course. The questions used were: When may a student change a course? and When may a student drop a course? West Riding usage required the substitution of the word "subject" for "course." Response categories were:

0. Never
1. Only at the year end
2. Only at the end of a semester or term
3. At any time. (For item 18 the proviso that there should be sufficient time to start the new course was added to this response category.)

Items 20, 21 and 22. These items were designed to assess the frequency with which students change programs or courses or drop courses. Three questions were: How often do cases of program change on the part of students occur? How often do cases of course change on the part of students occur? How often are there cases of students' dropping a course? For all three items the response categories were:

1. Never
2. Rarely
3. Infrequently
4. Sometimes
5. Frequently

Control of Raw Materials

Where raw materials are perceived as diverse and non-uniform, mechanisms for their control will incorporate flexibility and will not be characterized by centralized and rigid procedures which are standard throughout the school. In a highly diversified school, attendance will be recorded infrequently or not at all, explanations for absence will not normally be required and excessive or inexcusable absence may be dealt with differently for different individuals. Movement about the school buildings will not be rigidly patterned, and there will be no restriction on the scheduling of spare periods. Supervision of students with spare periods will not be carried out and there will be no centrally operated detention system or homework time table. Schools may therefore be examined for:

(a) Policies regarding the recording of attendance and the explanation of absence

(b) Policies regarding movement about the school

(c) Policies regarding spare periods

(d) Policies regarding detentions, and

(e) Policies regarding homework.

Ten items were used to examine these features. Since some of the features are commonly viewed differently according to whether the students concerned are attending school voluntarily or compulsorily, the phrase "for students above the statutory leaving age" was incorporated where necessary. This addition served also to facilitate the comparison between Alberta high schools and West Riding comprehensive schools.

Item 23. Record Attendance. The question was in the form: How is student attendance recorded? and response categories were:

1. Daily and formally in home rooms and subject classes
2. In every subject class throughout the day
3. Daily and formally in home room only
4. Not at all, informal cognizance is taken of absence.

Item 24. Explanation of absence. The question was in the form: What are the policies regarding student absence for students above the statutory leaving age? Three response categories were used:

1. A note explaning absence is required
2. No explanatory note is required but when legitimate absence is explained by note an appropriate symbol is used in the class attendance record
3. No note is required; absence is simply recorded

Item 25. Excessive or inexcusable absence. Respondents were asked: How is excessive or inexcusable absence dealt with for students above the statutory leaving age? The response categories were:

1. A standard system operates which sets out limits and consequences
2. A set of procedures is used but each case is dealt with on its merits
3. There is no standard set of procedures and each case is dealt with by an appropriate person in an appropriate way

Item 26. Movement of personnel. Respondents were asked: What is the school's policy about the movement of personnel? and four response categories were defined:

1. Staff move to students
2. Students move to staff
3. Students move to areas and staff move to students within areas
4. There are different policies at different levels of the school

Items 27, 28, 29 and 30. Spare periods. Item 27 referred to the school's policy on which students were permitted spare periods. Items 28, 29 and 30 3xamined the arrangements which were made for students with spare periods.

Item 27 asked: What is the policy regarding spare periods for students? and the following response categories were used:

0. Students are not scheduled to have spare periods
1. Spare periods are time tabled only in certain grades or forms
2. Spare periods are avoided as far as possible
3. Spare periods are avoided as far as possible in certain grades or forms, but there is no restriction in others
4. There is no restriction on the time tabling of spare periods

Item 28 asked: Is the attendance of students at spare periods recorded? and item 29 asked: Are spare periods supervised? For both questions the response categories were:

0. There are no spare periods
1. Yes, for all students
2. For some students
3. No

Item 30 asked: Where do students go during spare periods? and the responses were scored as follows:

0. There are no spare periods
1. All students must be in specified study areas
2. Some must be in specified study areas, others may be anywhere in the school or its grounds
3. All may be anywhere in the school or its grounds
4. All may go anywhere they please

Item 31. Detention. To the question, "Is there a centrally operated detention system?" only two possible responses were considered:

0. Yes
1. No

Item 32. Homework. Respondents were asked: How is homework assigned for pupils above the statutory leaving age? The four response categories were:

1. There is a centrally drawn up homework time table for all students
2. There is a centrally drawn up homework time table for some students
3. There is no time table but guidelines are centrally drawn up
4. Homework is assigned as deemed necessary by the teacher

The Scope of the Workflow

The scope of the workflow in a diversified school will be wider than that in a non-diversified school. In particular, more programs will be offered and the number of required subjects will be few. The scope of the diversified school's workflow will extend beyond the limits of instruction in classroom subjects and will include elements such as training in non-academic responsibility. Hence, class time may be scheduled for non-instructional activities. In such a workflow the perception of the student as a person and not merely a learner will lead to concern with his general welfare and not merely his academic welfare. This concern will be manifest in a commitment to pastoral care which may be evidenced by a house organization or a system of home room teachers or faculty advisors. The extent to which such staff are active in pastoral care may be reflected in their being key people whose advice the administration seeks in problem cases. A concern with a broad development of the student may be reflected by the attempt to give each student some free time during class hours, so that spare periods would be scheduled not merely as a matter of expediency, but as a matter of policy. Thus the items in this section were concerned with:

(a) The number of programs and required subjects
(b) Training in non-academic responsibility
(c) The use of class time for non-instructional activities
(d) The provision of pastoral care, and
(e) The policies regarding spare period allocation.

Eleven items were used to measure these concerns.

Items 33 and 34. Number of programs and required subjects.

Item 33 was scored as the number of programs offered in the school.

Item 34 was worded: Are any subjects required for students above the statutory leaving age, other than what are specified by governmental or external examining bodies? Responses were scored as follows:

1. More than two subjects
2. Two subjects
3. One subject
4. No required subjects

Items 35, 36, 37 and 38. Non-academic responsibility. Item 35 presented a checklist of five possible ways in which a school might provide training in non-academic responsibility and respondents were asked to indicate how many of these were used in their school. Not until after item analysis of the responses was it possible to say whether or not the item could be scored by simply counting the number of ways indicated. For this reason, items 36, 37 and 38 focussed on particular items from the list. Items 36 and 38 asked respectively whether students functioned as club or society officers and whether they formed a part of the school's authority structure. Both items were scored dichotomously (0 = No, 1 = Yes). Item 37 asked whether students were represented on policy making bodies in the school and the responses were scored as:

0. No
1. Sometimes or on an ad hoc basis
2. Regularly and formally

Item 39. Non-instructional activities. Respondents were asked to examine a list of seven non-instructional activities and to indicate which of them, if any, were assigned time during class hours on a

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regular basis. The item could not be scored until item analysis had been used to determine whether the seven items could be treated as a unidimensional scale.

Items 40, 41 and 42. The provision of pastoral care. Item 40 examined the provision of a house system and was scored as follows:

0. No house system is used
1. A house system is used for games only
2. A house system is used for games and other competitions
3. A house system is used for both the above purposes and for administrative purposes on special occasions
4. A house system is used for all the above purposes and for the discharge of pastoral responsibilities throughout the year

Item 41 ascertained whether provision was made for a home room teacher or equivalent and, if so, what his or her functions were. The response categories were:

0. There is no such position
1. The home room teacher exists as an administrative convenience (e.g., in communication)
2. The home room teacher functions as above and also carries responsibilities for assistance with student program planning and, possibly, pastoral care
3. The home room teacher has all the above responsibilities and a heavy responsibility for pastoral care

Item 42 attempted to confirm the responses to items 40 and 41 by determining which staff members the principal or headmaster would want to consult if a problem student was brought to his attention.

Item 43. Student work load. Respondents were asked: Is it school policy to attempt to give at least one spare period to every student above the statutory leaving age? Dichotomous responses were scored: 0 = No, 1 = Yes.

Evaluation and Reporting

In a highly diversified school procedures for evaluation and reporting will permit flexibility in the methods of evaluation used by teachers and will not overemphasize the standardization of achievement ratings. The advancement of students will not necessarily be according to fixed criteria of achievement. Reports to parents on student progress will allow for variability in reporting by any number of teachers, will not seek to minimize the subjective nature of such reports and will probably include a report on student activities in fields other than those of classroom instruction. Schools may therefore be examined for:

(a) Evaluation procedures

(b) Standardization of achievement ratings

(c) Criteria for student advancement, and

(d) The scope and format of report documents.

Eight items were used to operationalize these statements.

Item 44. Day to day evaluation. The question was in the form: How is the day to day evaluation of students carried out? and there were two response categories:

1. Teachers must comply with school specified procedures
2. By any method the teacher likes

Items 45 and 46. Inspection of achievement ratings. These items referred to the demands made upon teachers by the school's administration in respect of the marks they are required to submit.

Item 45 examined the frequency with which teachers were required to submit marks, and was scored on a six-point scale whose extremes were: 1. Marks required six or more times a year, and 5. Marks required only at the special request of an in-school administrator. Item 46 asked: In what form are final marks rendered? and was scored as: 1. In one standard form, 2. There are several permissible forms, 3. In any form the teacher likes.

Item 47. Student advancement. The form of the question was: What is the policy regarding the advancement of students from grade to grade, from form to form, or from one course to the next senior course? Respondents were asked to indicate whether advancement was dependent on success in the preceding stage: always (score 1), almost always but with rare exceptions, usually but with some exceptions, usually but with frequent exceptions, or never, since advancement is always automatic at the year end (score 5).

Items 48, 49, 50 and 51. Reporting. The response categories for these items should logically include the two extremes of "no reporting at all" and "verbal reporting only." Since these were never met with in the sample studied, they are omitted from the response categories shown below.

Item 48 ascertained the format of the report document and distinguished between a report form prepared by computer (score 1) and a report form prepared by hand (score 2).

Item 49 examined the instructional content of the report form and used the following response categories:

1. The report shows marks or grades only
2. The report shows marks or grades and selected comments from a set list
3. The report shows marks or grades, comments from a set list, and teacher written comments if desired
4. The report shows marks or grades and teacher written comments
5. The report consists largely of teacher written comments with marks or grades added for information
6. The report shows no marks or grades and consists solely of teacher written comments

Item 50 referred to the scope of reporting and was scored as follows:

1. The report shows achievement only in the subjects studied
2. The report includes a general summary
3. The report includes a general summary and may also carry comments on extra-curricular work

Item 51 was concerned with which staff were involved in the production of reports and used five response categories:

1. The report is signed by no staff
2. The report is signed by subject teachers or home room staff only
3. The report is signed by both the above
4. The report is signed by both the above and by a senior staff member or by the principal/headmaster
5. The report is signed by all the above

SUMMARY

This chapter has described the adaptation of three instruments from the Aston studies and the construction of an instrument to measure a school's technology in terms of the Diversification of its Workflow.

In adapting the Aston instruments of Functional Specialization, Formalization of Role Definition and Concentration of Authority, various problems needed solution before the content of the instruments could be changed to a form appropriate to schools. The problem varied with each instrument but had in common the fact that they posed basic questions of the equivalence of concepts in the setting of manufacturing and school organizations. The basis for the determination of conceptual equivalence as well as the linguistic equivalence of individual items was provided by the conceptual framework of this study which viewed schools as people-processing organizations serving parents and a community and working with raw materials (students) who became the output provided to the markets of employers or institutions of further education. The construction of the instrument to measure Diversification of Workflow was based upon a conception of six distinct elements of the workflow of a school, each of which was considered in terms of what provisions, policies or practises might be held to vary along a continuum of low to high diversification.

The adaptation of the Aston instruments resulted, in each case, in a longer set of items than were included in the original instruments, and in the Diversification of Workflow instrument fifty-two separate items were devised. This large number of items (137 items across all instruments) was the basis for the empirical refinement of the instruments by tests of internal consistency, and this refinement process is described in the following chapter.

Chapter 6

THE REFINEMENT OF THE INSTRUMENTS BY TESTS OF INTERNAL CONSISTENCY

Sub-problem 2 was:

> To refine the instruments devised in sub-problem 1 by the use of tests of internal consistency using data obtained from twenty-one schools.

The tests of internal consistency used for the refinement of the instruments have been described in Chapter 4. These tests were: item analysis using the Brogden general biserial coefficient (GBR), a split-half reliability test, and the calculation of Kendall's coefficient of concordance (W). The first two tests were used on items in the adapted instruments (Functional Specialization, Formalization of Role Definition, Concentration of Authority) and all three tests were used in the refinement of the measure of Diversification of Workflow.

This chapter describes the results of the tests, instrument by instrument, and presents the final refined sets of items which were used as a measure of each variable in dealing with the remaining sub-problems of the study. The results of all tests of internal consistency are summarized in Table 15 (p. 171).

FUNCTIONAL SPECIALIZATION

The first step in the refinement of the forty items in the adapted version of the Functional Specialization instrument was that of item analysis. As a result of successive item analyses seventeen items were retained and these were used in the split-half reliability test. Of the two procedures, item analysis was the more complex.

Item Analysis

In the original Aston work the item analysis of the items in the Functional Specialization scale was a straightforward analysis of binary data. In the present study the procedure was not so straightforward because of the manner of scoring the variable by combining the number of items performed, the number delegated and the number of different delegates.[17] Of these three elements, the third (number of different delegates) referred to all items together and was therefore not appropriate for item analysis. The other two elements could each be considered in relation to each item: Was the item performed? Was the item delegated? Binary responses to these two questions yielded different matrices, so that the question arose of which matrix to use in item analysis. If all schools had performed the same activities it would only have been necessary to perform item analysis on the data referring to delegated activities and the analysis would have become as straightforward as the original Aston analysis. In the sample studied, however, schools differed in the number of activities performed as well as in the number delegated. Moreover, schools which performed the same number of activities differed, in some cases, as to which those activities were.

Since the purpose of the item analysis was the isolation of those items which could be used to form a scale of Functional Specialization, to perform an analysis which ignored one or other of the elements of each item would have been to run the danger of distorting the validity of the set of items which was finally retained. Accordingly, item analysis was performed for all items in both the "performed" and "delegated" matrices, and the set of items which was finally retained was that set which met the specified criteria in both matrices.[18]

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[17] See above, pp. 97-101.

For reasons given earlier (pp. 74-75) it was also necessary to perform item analyses in three different groupings of schools: (1) all schools considered together, (2) Alberta schools, and (3) West Riding schools. Thus, for any given item, a GBR value was calculated six times in each item analysis--in three different "performed" matrices and in three different "delegated" matrices. As the analysis proceeded, items with a low GBR value in any of these six matrices were dropped and the remaining items were reanalyzed in the same way. Occasionally it was necessary to restore a previously dropped item in order to be certain that its GBR value still remained low when it was calculated in the context of a different set of items.

Following these procedures meant that the reduction of the number of items was a slow process. From the original set of forty items seven major reductions were made--to thirty-two, thirty, twenty-eight, twenty-five, twenty-four, eighteen and, finally, seventeen items. An indication of the kind of results obtained is best given by considering three of these sets. Table 7 shows the results of the analyses first using all forty items, second using twenty-eight of of them and third, using the finally accepted set of seventeen. The top half of the table shows the results in the matrix of items performed, the lower half in the matrix of items delegated. For each set of items in each matrix the table shows the range of GBR value obtained, the mean GBR and the item numbers of those items which failed to reach the criterion value of 0.40. This information is shown separately for the analyses using the whole sample and the two sub-samples of Alberta and West Riding schools.

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[18] For all item analyses performed in the study the criteria for acceptance of a set of items were that no item should have a GBR value of less than 0.40 and that the mean GBR for all items in the set should not be less than 0.63 unless certain other conditions were fulfilled. See above, pp. 81-82.

When all forty items in the adapted instrument were used GBR values ranged from -0.929 to 1.000. Mean GBR values in both the whole sample and the two sub-samples were low, and twenty-five items yielded values of GBR which were below the criterion value in either the matrix of items performed or the matrix of items delegated or both.

Since the GBR value of any given item changes with the composition of the set of items in which it is included, simply to remove these twenty-five items would have been to run the risk of distortion. In fact, an inspection of the table shows, the final set of seventeen items which was retained included five items (items 1, 6, 21, 35, 39) which in this first analysis had failed to yield the criterion value of GBR.

Accordingly, the next runs of the analysis removed only those items with the lowest GBR values before recalculating each matrix. By the time the number of items had been reduced to twenty-eight the results obtained in the matrix of items performed were much closer to those required for acceptance: the range of GBR values was smaller and included no negative values, the mean GBR in both the whole sample and the sub-samples exceeded the criterion and only one item (item 12)

Table 7

The Refinement of the Functional Specialization Instrument: Item Analysis Results for Three Sets of Items$^{(a)}$

Matrix Title	No. of Items Analyzed	Range of GBR values (b)			Mean GBR value (b)			Items with GBR < 0.40		
		WS	A	WR	WS	A	WR	WS	A	WR
Items Performed	$40^{(c)}$	-0.556 to 1.000	-0.846 to 1.000	-0.929 to 1.000	0.421	0.338	0.555	4,5,10, 13,14, 16,20, 26,27	4,10,13 14,16, 20,24, 26,27, 28,39	10
	$28^{(d)}$	0.355 to 1.000	0.489 to 1.000	0.561 to 1.000	0.754	0.769	0.862	12	-	-
	$17^{(e)}$	0.822 to 1.000	0.812 to 1.000	-	0.946	0.934	1.00	-	-	-
Items Delegated	$40^{(c)}$	-0.347 to 1.000	-0.739 to 1.000	-0.884 to 1.000	0.307	0.292	0.413	3,4,5, 8,9,14 16,17, 19,20, 21,22, 24,26, 27,28, 30,36, 39,40	1,3,4,5 9,14,16 17,19, 20,21, 22,24, 26,27, 28,30, 36,39 40	3,6 10, 24, 26, 28, 35, 39, 40
	$28^{(d)}$	-0.229 to 1.000	-0.655 to 1.000	-0.636 to 1.000	0.414	0.409	0.457	3,8,9, 12,19, 22,24, 30,36, 40	3,8,9, 11,19, 22,24, 30,36, 40	9, 12, 24, 32, 40
	$17^{(e)}$	0.551 to 1.000	0.417 to 1.000	0.426 to 1.000	0.739	0.759	0.698	-	-	-

Notes:

(a) Abbreviations as follows: WS = whole sample, A = Alberta, WR = West Riding

(b) Excludes values of 1.00 which represent non-discriminating items

(c) All items

(d) Items 1,3,6,7,8,9,11,12,15,18,19,21,22,23,24,25,29,30,31,32,33,34,35,36,37,38,39,40

(e) Items 1,6,7,11,15,18,21,23,25,29,31,32,33,34,35,37,39 gave a GBR of less than 0.40. In the matrix of items delegated, however, these twenty-eight items gave less reassuring results: negative values were still present, all means were unacceptable and twelve items had a GBR of less than 0.40.

Further analysis reduced the number of items until a set of seventeen items was obtained which met or exceeded the requirements for acceptance. In the matrix of items performed these seventeen items yielded GBR values between 0.812 and 1.00 and all means exceeded 0.934. Values in the matrix of items delegated were lower, the range being from 0.417 to 1.00 and means in the whole sample and the Alberta and West Riding sub-samples being respectively 0.739, 0.759 and 0.698.

These items were considered to approximate a Guttman scale in respect of both the performance and the delegation of items.[19] To check this, and to verify their homogeneity in terms of Functional Specialization, the items were used in a split-half reliability test.

The Split-half Reliability Test

In order that the split-half reliability test should test for homogeneity in terms of Functional Specialization and not merely in terms of the performance or delegation of items, it was necessary to compute a Functional Specialization score for each half of the set of items.

The seventeen items were assigned alternately to one of two different groups. Each of these groups was used to calculate a Functional Specialization score for each school. The scores were calculated in two ways, one using the formula $(b^2 + ai)$ and one using the formula b.a.i).[20] These scores were used to rank the schools in the whole sample and in the two sub-samples. For each grouping of schools and for each formula Spearman's rank correlation coefficient (rho) was calculated as a measure of the agreement between the rankings on the first group of items and those on the second. The results of this analysis are included in the summary table (Table 15, p. 171). All correlations were significant at a probability level ≤ 0.10, thus permitting the conclusion that the items combined formed a homogeneous set in respect of Functional Specialization.

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[19] Items 1,6,7,11,15,18,21,23,25,29,31,32,33,34,35,37,39.

One further aspect of the results of this analysis can be seen in Table 15. The rankings yielded by the formula (b.a.i) were more closely associated than those yielded by the preferred formula $(b^2 + ai)$. This finding had implications for the manner of scoring Functional Specialization and confirmed the wisdom of the decision to use both formulae in the later analyses of the relationships between variables.

The Refined Adaptation

The detailed composition of the adapted and refined Functional Specialization instrument is shown in Table 8. The table also shows, beside each item, the number of the activity from which it was adapted in the original Aston instrument.

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[20] See pp. 97-101. i = items performed, a = items delegated, b = number of different delegates.

The computation of the number of different delegates in this test presented a complication since it sometimes happened that a person delegated to perform an item in the first group was also delegated to perform an item in the second group. Where this arose the groups were considered separately and the number of different delegates in each group was counted.

Table 8

Functional Specialization: The Refined and Adapted Instrument and Source References

Item No.	Item	Aston Activity No.
1	Arranging appeals, fund raising, publicity, etc.	1
6	Producing a school newspaper	1
7	Co-ordinating the presentation of careers advice to students	2
11	Co-ordinating transportation for field trips	3
15	Allocating staff to broad areas of work	4
18	Operating canteen or cafeteria facilities	6
21	Operating medical facilities	6
23	Stock control	7
25	Operating caretaking services	8
29	Accounting or business functions	9
31	Drawing up or co-ordinating overall discipline procedures	10
32	Co-ordinating student advancement	11
33	Preparing examination schedules	11
34	Making arrangements for seating and space allocation for examinations	11
35	Devising new ways of time tabling existing courses or programs	12
37	Operating record keeping or filing systems for student records	14
39	Handling legal or insurance affairs	15

In three cases the original Aston activity was represented by more than one item. These three activites (#1 - Develop, legitimize and symbolize the organization's charter; #6 - Maintain human resources and promote their identification with the organization; #11 - Control the quality of materials, equipment and outputs) may be held to be among the more complex of the Aston items and the duplication of items within these activities was therefore regarded as not unreasonable in the adaptation.

Of greater interest was the fact that three other Aston activities were no longer represented in the final set of adapted items. These three activities were #5 (Develop and transform human resources), #13 (Devise new outputs, equipment and processes) and #16 (Acquire information on the operational field). The exclusion of these activities meant that, in the sample studied, they were not part of the set of activities by which Functional Specialization could be measured. The activities themselves, however, are not necessarily unimportant in schools. The original raw data show that the co-ordination of in-service training (activity #5) was performed and delegated in all the Alberta schools in the sample and was not performed in any of the West Riding schools. The reverse was true for activity #13, except that West Riding headmasters did not delegate the activity. Activity #16 was performed in all schools except one in the sample and about half of the schools delegated the activity. Comments by respondents indicated that where these activities were not performed in the school they were performed in the central office of the local system. Hence a reasonable explanation of the omission of these three activities from the set of Functional Specialization items is that they tend to fall into an area in which the responsibilities of schools and local systems overlap, and that they are retained in central office jurisdictions often enough to make them unrealistic as indicators of specialization in schools.

FORMALIZATION OF ROLE DEFINITION

The twenty-one items devised in the adaptation of the Aston Formalization of Role Definition instrument were reduced to seventeen items by item analysis, but did not form a single homogeneous set of items. As a result of the analyses described below two sets of items were accepted, one measuring formalization at the local system level, the other at the school level.

Item Analysis

In each of the three groupings of schools (whole sample, Alberta, West Riding) item analysis was performed for three matrices of items. These three matrices were: (1) all items together, (2) local system items, (3) school items. In each matrix the raw data were converted to binary data using the procedure described above (p. 83), and the GBR values for each item and sub-item were calculated.

Table 9 shows the item analysis results in each grouping of schools for the three matrices and for a reduced matrix of school items. Since several items in this instrument were multicategory items and since, in these cases, a GBR value was calculated for each score category or sub-item within an item, it was possible for one sub-item to yield a low GBR value and for the other sub-items in the same item to yield high values. Where this arose the table lists the sub-item number with its main item number and separates the two by a slash mark (/). Thus, reference in the table to item 11/3 is to the score category 3 of item 11.

Table 9

The Refinement of the Formalization of Role Definition Instrument: Item Analysis Results$^{(a)}$

Matrix Title	No. of Items	Range of GBR values (b)			Mean GBR value (b)			Items with GBR $<$ 0.40 (c)		
		WS	A	WR	WS	A	WR	WS	A	WR
All Items	21	-0.266 to 1.000	-0.350 to 1.000	0.025 to 1.000	0.523	0.334	0.713	1/2, 4/5, 4/6, 6,16, 17,18 19	1/2, 4/5, 4/6, 16,17 18	11/3 14, 16, 17, 18, 19
System Items	$7^{(d)}$	0.300 to 1.000	-	-	0.825	1.00	-	6	-	-
School Items	$14^{(e)}$	0.253 to 0.847	-0.024 to 0.957	0.025 to 1.00	0.650	0.653	0.714	11/3 16,17 18,19	11/3 16, 18	11/3 14, 17, 18, 19
School Items	$10^{(f)}$	0.358 to 1.000	0.177 to 1.000	-0.066 to 1.000	0.651	0.674	0.686	11/3	11/3 20, 21	11/3 14, 15

Notes:

(a) Abbreviations are as follows: WS = whole sample, A = Alberta, WR = West Riding

(b) Excludes values of 1.00 which represent non-discriminating items

(c) Numbers preceded by / are numbers of sub-items (score categories) within one item

(d) Items 1 - 7

(e) Items 8 - 21

(f) Items 8, 9, 10, 11, 12, 13, 14, 15, 20, 21

When all twenty-one items were considered together the range of GBR values was great and, in the whole sample and the Alberta sub-sample, included negative values. The mean GBR values for these two groups of schools were below the criterion mean of 0.630. Nine items had GBR values below 0.40. When the items referring to local system documents (items 1 to 7) and those referring to school documents (items 8 to 21) were considered separately a more reassuring picture emerged. The system items yielded GBR values ranging from 0.30 to 1.00 in the whole sample, and in the two sub-samples all GBR values were unity. Only item 6 had a GBR value below 0.40. The school items gave acceptable mean values of GBR in all three groupings of schools, but several items failed to give GBR values of 0.40 and one item had a negative GBR value in the Alberta sub-sample. A further analysis was performed on a reduced number of items in the school documents matrix. This yielded satisfactory mean values of GBR in all three school groupings but showed five items with GBR values of less than 0.40. Further analyses of this matrix removing some or all of these five items did not materially improve the results.

These analyses appeared to warrant the separation of the twenty-one items into two groups dealing respectively with local system documents and school documents. However, in these two groups six items had a GBR value below the criterion value, and it was necessary to decide how to deal with these items.

In the set of system items the one item which did not yield an acceptable GBR value was item 6. However, since its GBR value was not excessively low (0.30), and since it was a good discriminator when the Alberta and West Riding sub-samples were considered separately, it was retained in the final set of system items. Of the five items in the school documents matrix which gave low GBR values one (11/3) was a sub-item in a five-category item. Its GBR values in the three groupings of schools (0.358, 0.365 and 0.341 respectively) were close to the criterion value and the other sub-items of item 11 all had GBR values of 0.645 or higher. The other four low items (items 14, 15, 20, 21) each yielded a satisfactory GBR value in two out of the three groupings of schools, and in view of the fact that their removal had not greatly improved the item analysis results, they, together with item 11, were included in the final acceptable set of items which were used in the split-half reliability test.

The Split-half Reliability Test.

The measurement of Formalization of Role Definition by two sets of items meant that each set had to be considered separately. The set of system items, by definition, applies equally to all schools in the system and therefore the split-half reliability test could be carried out only for the whole sample of twenty-one schools. In the case of the set of school items the test was performed for each of the three groupings of schools.

The results of the tests are shown in the summary table (Table 15, p. 171). In all cases the correlation between the ranks obtained on one half of the set of items and those obtained on the other was significant at a probability level ≤ 0.50, and it was concluded that each of the sets of items was homogeneous and could be used to measure respectively formalization by the local system and by the school organization. The items included all those from the original Aston instrument together with two added in this study--item 15 (written school rules) and item 21 (regular written administrative bulletins). The complete adapted instrument is shown in Appendix A.

CONCENTRATION OF AUTHORITY

In the adapted Concentration of Authority instrument item 17 ("What shall be costed?") was removed before the analysis since principals and headmasters found difficulty with the question and, in several cases, felt it could not be answered. The remaining thirty items were reduced to fourteen by item analysis and the split-half reliability test was used to confirm their homogeneity. Problems arose in the refinement of the instrument because of the presence of score category 3 to describe decisions made at the level of the board of governors in West Riding schools--a level of authority which does not exist in Alberta. A description of the way this problem was overcome is included in the account of the item analysis which follows.

Item Analysis

The results of the most important of the several iterations of item analysis for this instrument are shown in Tables 10 and 11. Table 10 presents the results of the first run of the analysis in the whole sample and the Alberta and West Riding sub-samples. Table 11 shows the results of later refinements in the two sub-samples only.

The results of the first run, using all thirty items, showed a wide range of GBR values in all three groupings of schools and included negative values in the whole sample and the Alberta sub-sample. Mean GBR values in these two groupings of schools were unacceptable, although the West Riding schools yielded a mean GBR value of 0.760. A total of

Table 10

The Concentration of Authority Instrument:
First Run Item Analysis Results(a)

No. of Items	Range of GBR values (b)			Mean GBR values (b)			Items with GBR ≤ 0.40		
	WS	A	WR	WS	A	WR	WS	A	WR
30(c)	-0.655 to 0.819	-0.667 to 0.859	0.280 to 1.000	0.307	0.418	0.760	5,6,9 12,13 14,15 16,18 20,23 24,26 27,28 29,30	15,18 24,26 27,28	22, 23

Table 11

The Concentration of Authority Instrument:
Final Item Analysis Results for Alberta
and West Riding Sub-samples Only(a)

No. of Items	Range of GBR values (b)		Mean GBR values (b)		Items with GBR ≤ 0.40	
	A	WR	A	WR	A	WR
23(d)	-0.030 to 1.000	0.167 to 1.000	0.646	0.785	10,11,23 25	23
14(e)	0.153 to 1.000	0.667 to 1.000	0.783	0.933	25	-

Notes:

(a) Abbreviations as follows: WS = whole sample, A = Alberta, WR = West Riding
(b) Excludes values of 1.000 which represent non-discriminating items
(c) All items except item 17
(d) Items 1,2,3,4,5,6,7,8,9,10,11,12,13,14,16,19,20,21,23,25,29,30,31
(e) Items 2,3,5,6,9,12,13,14,16,20,25,29,30,31

eighteen items had values of GBR below the criterion value in one or more than one of the school groupings.

On the basis of these results only twelve items could be retained in the instrument. Moreover, of these twelve items four did not discriminate between the schools in any way. Simply to retain the eight discriminating items as a scale of Concentration of Authority seemed a questionable procedure for two reasons: first, the reduction in the number of items would be drastic, given the fact that the original Aston instrument itself used twenty-three items, and second, more than half of the unacceptable items were unacceptable only in the analysis by whole sample, and gave GBR values above the criterion level in the separate sub-samples.

Inspection of the raw data showed that the key to the problem lay in the fact that the Alberta and West Riding sub-samples were not strictly comparable in that no decision level 3 (board of governors) could exist in an Alberta school. Two possible solutions to this problem were considered. The first was to remove those items which yielded a score of 3 in the West Riding schools and use for all schools only those items which had been scored 0, 1, 2, 4, 5 or 6. The second possible solution was to consider each sub-sample separately and isolate those items which satisfied the item analysis criteria in Alberta and West Riding schools, but not necessarily in the whole sample of schools combined.

The first of these solutions was considered the weaker of the two, since it would distort the reality of decision-making in the West Riding where headmasters had reported that as many as eight of the listed decisions were made by the board of governors of their school. An item analysis which was performed using this first solution did nothing to make the solution more acceptable. GBR values for several items were lower than those given by the original analysis and mean GBR values were lowered.

The use of the second solution would not establish a set of items which were necessarily scalable over the whole sample of twenty-one schools, but it could establish a single set of items which were scalable in each of the sub-samples. The disadvantage would be that the total scores on Concentration of Authority which would result from such a set of items would not be as legitimately comparable as scores derived from a set of items which were scalable over the whole sample of schools. However, the fact of the different levels of decision-making in Alberta and the West Riding makes this kind of comparison difficult in any case, and what may legitimately be compared--the number of decisions permitted at the school level and the levels within the school at which they are made--is something which could be measured by a set of items scalable in each of the sub-samples.

Accordingly, the second solution was adopted and only those items were removed which had yielded low GBR values in either the Alberta or the West Riding sub-sample. This gave a set of twenty-three items which were reanalyzed in each sub-sample.

Table 11 shows the results of this analysis. Although mean GBR values were acceptable, the range of values was large and five items had values of GBR which did not reach the criterion level. Further analyses reduced the number of items to twenty, of which several did not discriminate. Such non-discriminating items are normally discarded since they do not contribute to the scalability of a set of items. However, in view of the fact that a single set of items was required by which the two sub-samples could be compared, the decision was taken to retain such items if they discriminated between sub-samples.

Six of the twenty items retained at this point in the analysis were scored identically in all twenty-one schools and were removed from the analysis. GBR values were recalculated for the set of fourteen items remaining and gave means of 0.783 and 0.933 in Alberta and the West Riding respectively. One item (item 25) gave a low GBR (0.153) in the Alberta sub-sample, but it was among the most powerful discriminators in the West Riding schools. For this reason it was retained and the set of fourteen items became the finally accepted set which was used in the split-half reliability test.

The Split-half Reliability Test

A split-half reliability test was carried out using Spearman's rank correlation coefficient to assess the degree of association between the rankings obtained by all schools on each half of the set of items. The results are shown in the summary table (Table 15, p. 171). In all groupings of schools the correlations were significant at a probability level ≤ 0.005 and permitted the conclusion that the fourteen items constituted a homogeneous set.

The Refined and Adapted Instrument

Details of the composition of the set of fourteen items finally accepted are shown in Table 12 which also shows the numbers of the Aston items from which they were adapted.

Two of the Aston items (Aston #1 and #2) were represented by two items each in the adapted instrument and both of them referred to

Table 12

Concentration of Authority: The Refined and Adapted Instrument and Source References

Item No.	Item	Aston Activity No.
	Who decides:	
2	The number of department heads in the school	1
3	The number of teachers in the school	1
5	The appointment of a department head	2
6	The appointment of a teacher	2
9	The amount of the allowance of department heads over and above their teacher salary	4
12	What type or brand new equipment is to be	7
13	The introduction of a new course or subject	8
14	The introduction of a new program	8
16	Which employment or further education opportunities shall be presented to students	~~10~~
20	To dismiss or demote a department head	14
25	What and how many staff welfare facilities are to be provided	18
29	To alter the responsibilities of caretaking staff	21
30	To create a new department	22
31	To create a new job	23

staffing--the first to establishments and the second to appointments. This seemed reasonable in view of the decision in the present study to include the establishment and appointment of teachers as well as of supervisory staff.

Eleven of the Aston items were omitted from the adapted instrument. Two of these items (Aston #11 and #13) were removed from the adaptation before the analysis for reasons given in the preceding text. Of the remaining nine missing Aston items, two (Aston #5 and #6) referred to the spending of unbudgeted or unallocated money and the raw data in the present sample showed that, in all cases except three, principals or headmasters exercised control over any discretionary funds entrusted to the school. Moreover, interview responses indicated generally that unbudgeted or unallocated money was not of great significance in the school setting where the great majority of funds are apportioned by central office, even though the budgeting may be decentralized.

The omission of Aston item #15 (training methods) matched a similar omission in the adaptation of the Functional Specialization instrument where in-service training was not an item which could meaningfully discriminate between schools. Its omission here may be connected with the omission of Aston item #20 (alter the responsibilities of specialist departments). This item was interpreted as referring to the alteration of the responsibilities of teaching staff, and its omission probably also reflects the usual school practice of appointing staff to work in a particular area; following which, changes in their responsibility are rare or minor.

The other five missing Aston items (Aston items #9, #12, #16, #17, #19) all referred to some aspect of those typically commercial or manufacturing activities which were adapted in this study by equating students with raw materials which were provided by feeder schools and "distributed" to the market of employers, and whose price was seen in terms of the various costs upon parents. Their omission from the final adapted instrument may go some way to satisfying those who might feel the analogies ~~used in~~ the adaptation were somewhat forced, and indicates, perhaps, a real area in which schools and manufacturing organizations are not strictly comparable.

DIVERSIFICATION OF WORKFLOW

The refinement of the fifty-two items in the Diversification of Workflow instrument was a complex procedure which was undertaken in three stages. First the degree of association between items in different groups was assessed by using Kendall's coefficient of concordance. Second, item analysis was carried out on different sets of items and led to the isolation of two separate sets. Third, a split-half reliability test was performed using the two sets of items which had been isolated by the first analyses. The two sets of items appeared to measure different aspects of diversification and a discussion of them is given below after the description of the stages of the analysis.

The Association Between Items

Chapter 5 described the conceptualization of each of the items in the instrument in terms of six elements held to be present in a school's workflow. The first step in the refinement of the instrument was to check whether there was any empirical association between the items originally conceived to be associated within each of the six elements.

In each of the hypothesized elements of the workflow the items were used to rank the schools in the whole sample and each of the subsamples. Kendall's coefficient of concordance was then calculated to assess the degree of association between the ranks assigned, and the significance of the result was obtained by converting the obtained value of the coefficient (W) to chi square (Siegel, 1956:213-223).

Table 13 presents the results of this analysis. On the left of the table are listed the groupings of items tested. In the body of the table are shown the value of chi square obtained and an indication of those values which reached significance at a probability level less than or equal to 0.10. Except for items listed under the heading of Equipping, no set of items was significantly associated at the criterion level of probability in more than one of the three groupings of schools. Since many of the items listed under Equipping were made up of different ways of using the same basic data, they could not be accepted as an associated set of distinct items without further analysis. The table shows the results of one of these further analyses (using items 1, 2, 5, 10A) which grouped items in such a way as to avoid using more than one item derived from the same raw data. In no case did these analyses of different groupings of the Equipping items yield acceptable results in more than one of the three groupings of schools.

This first analysis indicated clearly that the items were not associated in the sample in the way in which they had been conceptualized. An inspection of the raw data, however, gave some insight into a different way in which the items might be associated. When the scores on each item were examined they fell fairly clearly into three groups: (a) those in which the mean scores obtained by Alberta and West Riding schools were

Table 13

The Diversification of Workflow Instrument: Results of Kendall's Coefficient of Concordance Applied to Items Grouped by Six Elements(a)

Element of the Workflow	Whole Sample (chi square)	Alberta (chi square)	West Riding (chi square)
Equipping			
(i) Items 1 - 10A	92.008 (b)	46.636 (b)	13.876 (b)
(ii) Items 1,2,5,10A	22.083	18.002 (b)	1.927
Placement of Raw Materials			
Items 11 - 13	38.458 (b)	10.393	5.890
Sequencing the Workflow			
Items 14 - 22	13.621	20.223 (b)	5.051
Control of Raw Materials			
Items 23 - 32	15.419	23.312 (b)	8.605
Scope of the Workflow			
Items 33 - 43	32.615 (b)	8.646	12.236
Evaluation and Reporting			
Items 44 - 51	102.002 (b)	11.595	5.035

(a) Kendall's coefficient of concordance yields a W statistic. For samples larger than N=7 the significance is tested by using W to calculate chi square. Only the obtained chi square is reported in this table.

(b) Significant at $p \leqslant 0.10$

the same or very similar, (b) those in which the mean score of West Riding schools was considerably higher than that of Alberta schools and (c) those in which the Alberta mean was considerably higher than the West Riding mean.

Twenty-four items were in the second of these categories and twenty-one in the third. A coefficient of concordance was calculated for each of these sets of items. Those items which yielded a higher mean score in the West Riding schools showed a significant association ($p = 0.05$) in both the whole sample and the West Riding sub-sample. The items which gave a higher mean score in the Alberta schools showed a significant association ($p = 0.05$) in the whole sample and the Alberta sub-sample. These sets of items, while not acceptable in terms of a clear association in all three groupings of schools, gave better results than any set of items previously considered. Accordingly, they were regarded as suitable as a basis for further refinement using item analysis techniques.

Item Analysis

The item analysis program previously used was modified so as to permit the analysis of any combination of items from the Diversification of Workflow instrument. Those items which yielded higher mean scores in West Riding schools were first analyzed and after several runs, the twenty-four items were reduced to a basic set of eight items, all of which had GBR values greater than 0.40 and which gave mean GBR values of 0.972, 0.936 and 1.000 in the whole sample and the Alberta and West Riding sub-samples respectively.

Since these eight items had been isolated from a set which excluded more than half of the items in the original instrument, it was necessary to check whether other items could be added without seriously impairing the GBR values already obtained. The process of building on the basic set was one of adding all other items, at first singly, then in pairs, threes and fours, obtaining GBR values at each stage and rejecting items or groups of items which did not produce acceptable results. As an end product of this process three more items were added and the resulting set of eleven items all gave GBR values greater than 0.40 and mean GBR values of 0.931, 0.679 and 0.900 in the three groupings of schools.

The identical process was repeated, using as a starting point those items which had yielded higher mean scores in the Alberta schools. Again, a set of eleven items resulted, all of whose GBR values were greater than 0.40 and whose mean GBR values in the three groupings of schools were 0.865, 0.759 and 0.675 respectively.

Further analysis using items not included in the two sets already established showed that none of them were associated in such a way as to enable the formation of a third set of items. Accordingly, the two sets were accepted as the only sets of scalable discriminating items contained in the Diversification of Workflow instrument, and they were subjected to a split-half reliability test.

The Split-half Reliability Test

The results of the split-half reliability test on these two sets of items are shown in the summary table, (Table 15, p. 171). For each set, Spearman's rank correlation coefficient was used to test the degree of association between ranks obtained by schools on each half of the items. All associations were significant at a probability level ≤ 0.05 and thus permitted the conclusion that each set of items was a homogeneous set, measuring one aspect of diversification in a school's workflow.

The Two Aspects of Diversification

The established statistical homogeneity of the two sets of items posed the question of how to describe each set. Table 14 lists the items which make up the two sets Set I consists of items built around the basic set which gave higher mean scores in the West Riding schools. Set II consists of items built around those on which the Alberta schools scored higher.

At first sight it was difficult to see an underlying dimension in either of the sets. Set I contained five items from the original "Evaluation and Reporting" element, but also included items from "Sequencing," "Control" and "Scope." Set II had a large component of "Control" items and also included items from "Sequencing" and "Scope."

Some community among the items of each set began to emerge, however, when the meaning of a high score on each was taken into consideration. It was most readily apparent in Set II. In each of the items in this set a high score indicates in some way a lack of restriction imposed upon students, particularly in their out-of-classroom time. From this viewpoint what emerges is a structure which is control-free, and which acknowledges students as a diverse body of people whose diversity is not only acknowledged by lack of restriction, but is also catered for (items 20 and 21) and used (item 37). The items seem to focus on the way the diversity of students is accepted in those areas of the workflow which are not concerned with actual instruction.

Set I has a different focus. High scores on these items

Table 14

The Two Statistically Homogeneous Sets of Items in the Diversification of Workflow Instrument

Set I		Set II	
Item	Description	Item	Description
17	How frequently does it happen that a student has to revise his selection of courses because what he originally wanted to do is not possible on the time table?	14	What is the policy governing the time at which students arrive each day?
23	How is student attendance recorded?	20	How often do cases of program change on the part of students occur?
25	How is excessive or inexcusable absence dealt with for students above the statutory leaving age?	21	How often do cases of a course change on the part of students occur?
27	What is the policy regarding which students may be scheduled to have spare periods?	24	What are the policies regarding the explanation of student absence (for students above the statutory leaving age)?
41	Is there a home room teacher (or equivalent) for each student? If so, what is the function of this person?	28	Is the attendance of students at spare periods recorded?
43	Is it school policy to attempt to give at least one spare period to every student (above the statutory leaving age)?	29	Are spare periods supervised?
46	In what form are final marks rendered?	30	Where may students go during spare periods?
47	What is the policy regarding the advancement of students from one level to the next senior level?	31	Is there a centrally operated detention system?
48	What format is used for reports to parents?	32	How is homework assigned for students above the statutory leaving age?
49	What does the report card show?	34	Are any subjects required for students above the statutory leaving age, other than what are specified by governmental or external examining bodies?
50	What may be included in reports to parents?	37	Are students represented on school policy making bodies?

indicate a high degree of personal interaction between teacher and student, flexibility in scheduling and evaluation procedures or breadth of interest in the student and his work. The structure which emerges here is one which is not essentially concerned with either the institutional control of students or their actual instruction, but with the extension of the classroom into areas which take account of the individuality of students.

The difference between the two foci might be crystallized by two hypothetical statements. The workflow characterized by high scores on the Set II items could well be based on some such statement as: "Our raw materials are people--diverse and non-uniform--and we will not force them into an institutionalized mould of behaviour but, rather, accept their diversity." The workflow characterized by high scores on the Set I items could derive from such a statement as: "Our raw materials are people--diverse and non-uniform--and it is the many aspects of them as people that must concern us." In the one case the emphasis is on the acceptance of diversity, in the other it is on the personalization of non-instructional aspects of the workflow.

This reasoning led to the labelling of the two dimensions as "Personalization" (Set I) and "Acceptance" (Set II). Although measuring different aspects of the diversification of a school's workflow, they are not necessarily in opposition but are, rather, complementary. This aspect of the nature of the two dimensions was confirmed by correlation analyses described in the following chapter.

SUMMARY

This chapter has dealt with sub-problem 2 and has described the refinement of the instruments whose adaptation and construction was dealt with in Chapter 5.

As a result of the use of item analysis, a split-half reliability test and (in the case of Diversification of Workflow) a calculation of Kendall's coefficient of concordance, the four instruments were modified so that each included only items which approximated a Guttman scale and which could be considered to form homogeneous sets.

The results of these tests for each instrument are summarized in Table 15. All statistics were significant at a probability level ≤ 0.10 which was the specified criterion for acceptance of a set of items

Seventeen items were finally accepted to measure Functional Specialization and seventeen also to measure Formalization of Role Definition. In the latter instrument the items measured two aspects of Formalization--that originating at the local system level and that stemming from within the school itself. The refined Concentration of Authority instrument consisted of fourteen items. The fifty-two items in the Diversification of Workflow instrument yielded two sets, each of eleven items, which were held to measure different dimensions of diversification and which were labelled respectively Personalization and Acceptance.

In two of the adaptations from the Aston work (Functional Specialization and Concentration of Authority) item analysis revealed that some items were not suitable for use in school organizations. There appeared to be two reasons for this. First, some activities used in the Aston instruments fall, in an educational setting, into an area in which the responsibilities of schools and local school

Table 15

Summary of Results of Tests of Internal Consistency on Four Instruments(a)

Instrument	Item analysis (Mean GBR)			Split-half reliability test (Spearman's rho)			Kendall's coefficient of concordance (chi square)		
	WS	A	WR	WS	A	WR	WS	A	WR
Functional Specialization: (1) b^2 + ai (17 items)	0.946	0.934	1.000	0.572 p=0.025	0.484 p=0.10	0.521 p=0.10	-	-	-
(2) b.a.i (17 items)	(items delegated) 0.739	0.759	0.698	0.742 p=0.0005	0.727 p=0.005	0.667 p=0.025			
Formalization of Role Definition: (1) School items (10 items)	0.651	0.674	0.686	0.639 p=0.005	0.687 p=0.05	0.649 p=0.05	-	-	-
(2) System items (7 items)	0.825	1.000	-	0.837 p=0.0005	-	-	-	-	-
Concentration of Authority (14 items)	0.416	0.783	0.933	0.769 p=0.0005	0.814 p=0.005	0.810 p=0.005	-	-	-
Diversification of Workflow: (1) Personalization (11 items)	0.931	0.679	0.900	0.920 p=0.0001	0.659 p=0.01	0.624 p=0.05	155.910 p=0.001	23.418 p=0.02	15.385 p=0.10
(2) Acceptance (11 items)	0.865	0.759	0.675	0.916 p=0.0001	0.725 p=0.005	0.801 p=0.005	118.598 p=0.001	37.550 p=0.001	19.475 p=0.02

(a) Abbreviations as follows: WS = whole sample, A = Alberta, WR = West Riding. p denotes probability level.

systems overlap, and are therefore not good measures of what takes place in a school itself. Second, some of the Aston items refer to processes which typically belong to manufacturing or commerical organizations and may represent areas in which, in spite of the drawing of more or less powerful analogies, schools and other organizations are not strictly comparable.

The data pertaining to the items retained in these refined instruments were used in the solution of sub-problems 3 and 4 and this work is described in the following two chapters.

Chapter 7

THE USE OF THE INSTRUMENTS:

SCORES AND CORRELATIONS

This chapter deals with sub-problem 3. The sub-problem was earlier stated in three parts, the first two of which referred to the extent to which the instruments discriminated between schools in terms of their administrative and workflow structures respectively. The third part of the sub-problem referred to the testing of relationships between the variables of size, administrative structure and technology or workflow structure, and hence was concerned with assessing the external validity of the measures. The chapter is in three major sections. The first deals with the discrimination provided by the instruments and the second with the external validity of the measures. The third section is a summary section.

THE ADMINISTRATIVE AND WORKFLOW STRUCTURE OF THE SCHOOLS

The instruments designed and modified in this study discriminated between the schools in the sample in terms of each variable of administrative and workflow structure. The scores of all schools on each variable are given in Appendix C in both raw and standard score form.[21]

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[21] For purposes of comparison all scores were standardized to a mean of 50 and a standard deviation of 15. These standardized scores were rounded off to the nearest whole number.

The following paragraphs briefly describe the results in terms of the range and distribution of scores, and Figure 3 presents frequency polygon diagrams to illustrate the distribution of scores on different variables. Since the structure of a school cannot be described in terms of a single variable the profiles of administrative and workflow structure in each school are also described.

Functional Specialization

Appendix C shows two scores for this variable. The first was calculated according to the formula ($b^2 + ai$) and the second by the formula ($b.a.i$).[22] Both calculations discriminated between schools, although the ranks obtained from the two calculations were not identical, the former calculation tending to raise the scores of those schools with the greatest number of different delegates.

In standard score form the range of scores over the whole sample was from 29 to 79 by the first formula and from 27 to 81 by the second. The distribution of scores was different for each formula (Figure 3). That produced by ($b^2 + ai$) shows a fairly even distribution, whereas that produced by ($b.a.i$) shows the heavier concentration of schools with standard scores below 62.

Formalization of Role Definition

In the case of Formalization by local system different scores were obtained in each system. The Edmonton Public School District was the least formalized and schools in that system yielded a score of 8 on the relevant items of the instrument. The West Riding schools gave

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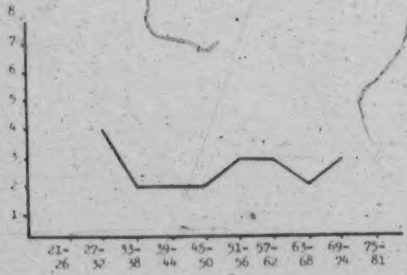
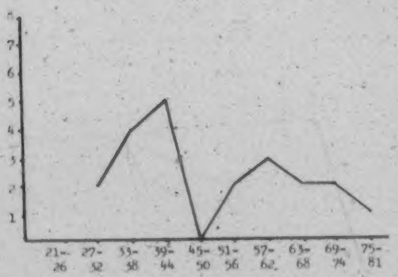
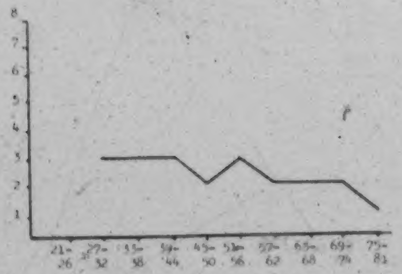
[22] See above, pp. 97 - 101



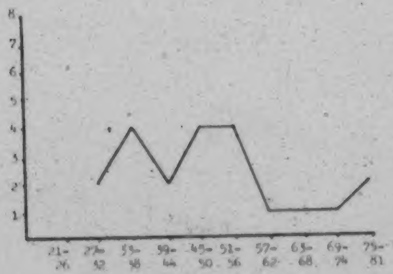
Formalization of Role Definition (School items)



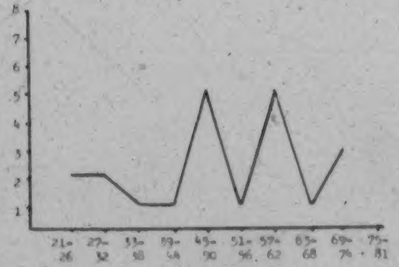
Overall Size of Supportive Component



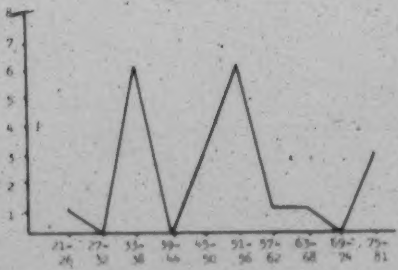
Functional Specialization (b e ai)



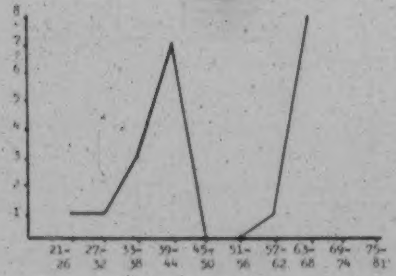
Functional Specialization (b.a.i)



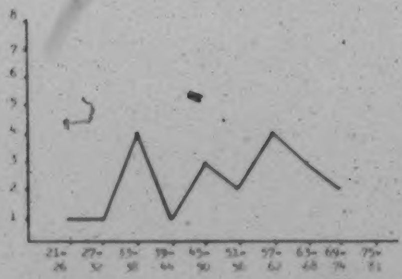
Concentration of Authority (Total score)



Level of In-school Decision Making



Personalization



Acceptance

Figure 3

Distribution of Scores on Variables of Administrative and Workflow Structure a score of 9 on these items and the Edmonton Separate schools 11.

The items measuring Formalization within individual schools yielded scores which, in the whole sample ranged from 2 to 16 (27 to 71 in standard score form) and whose distribution (Figure 3) was uneven with a high concentration of schools in the low and medium score ranges.

Structuring of Activities

The justification for the addition of two component variables to give a score of Structuring of Activities was less clear in the present study than in the Aston study. The component variables (Functional Specialization and Formalization of Role Definition) were selected in the Inkson et al. (1970a) abbreviated replication because of their high loadings on the Aston Factor I (Structuring of Activities). In the original Aston work (Pugh et al., 1968:83) the correlation between these two variables was 0.57 which, although not the highest correlation obtained between two structural variables, was nevertheless significant at a probability level of 0.005. In the present study a calculation of Spearman's rank correlation coefficient showed an association between Functional Specialization and in-school Formalization of rho = 0.104 for the formula $(b^2 + ai)$ and rho = 0.257 for the formula (b.a.i) over the whole sample. Neither of these figures is significant at a probability level of 0.10. Correlations between the two variables in the separate sub-samples gave no better results and neither did the attempt to correlate the separate elements of Functional Specialization with Formalization of Role Definition.

In view of these low correlations the addition of scores on the two component variables to form a single Structuring of Activities score was held to be a dubious procedure in the present study. Accordingly, while Functional Specialization and Formalization of Role Definition were retained as separate variables, no further analyses were performed with an aggregation of their scores.

Concentration of Authority

The scores derived from the Concentration of Authority instrument were used in three ways: first as total scores to indicate the average level of decision-making or, in Aston terms, the degree of Centralization; second as binary scores to indicate a school's autonomy in terms of the number of decisions which could be made at the school level; third to indicate the average level at which in-school decisions were made.

Total scores. The range of total scores given by the instrument was from 41 to 52 (22 to 74 in standard score form) and the distribution (Figure 3, p. 175) was bimodal. The raw score mean of 47 over the fourteen items retained in the instrument is an indication that decision-making in the schools studied tended to reside at levels above that of the principal or headmaster. Corroboration of this was given by the analysis of binary scores as a measure of Autonomy.

Autonomy. As noted earlier (p. 116) two Autonomy scores were used in the analysis. The first considered only those scores of 0, 1 or 2 (i.e., decisions made at or below the level of principal or headmaster). The second considered scores of 0, 1, 2 or 3 and thus interpreted the West Riding board of governors as an integral part of the school organization. Since the two Edmonton systems have no board of governors, the measure of Autonomy in their schools remained the same in both versions of the score. The Edmonton Public schools registered four out of the fourteen decisions as decisions which could legitimately be made at school level, and the Edmonton Separate schools registered six. In the West Riding schools the number of decisions which could be made at or below the level of headmaster ranged from two to five. When the board of governors was counted as part of the school organization all West Riding schools reported eight of the fourteen decisions as decisions which could legitimately be made at the school level.

The In-school Decision Level. The Autonomy score of a given school indicates only the number of decisions which may be made without reference to higher authority. The question arises of where, in the school, these "local" decisions may be made. Since the principal or headmaster is officially responsible for what happens in his school an assessment of the levels below him at which decisions may be made may give an indication of what the principal or headmaster permits rather than of what is specified by local system regulations or government legislation. What is permitted by the chief executive may, nevertheless, be considered an aspect of the administrative structure of the organization and it was therefore examined in this study.

For this analysis only items which scored 0, 1 or 2 were considered. For each school the scores obtained on these items were summed and divided by the number of such items. The average figure which resulted gave an indication of the degree to which local decision-making was spread over different hierarchical levels in the school or retained in the hands of the principal or headmaster. The range in raw score form was from 1 to 2 and the distribution was bimodal. In three schools the decision-making authority for all in-school decisions was retained by the principal or headmaster.

Formal and practised levels of decision-making. The rewording of the Aston rubric in the Concentration of Authority instrument has been described above (pp. 113-114). One of the advantages of the new wording was that it enabled comparisons between the levels of decision-making which were formally specified and the levels at which, for practical purposes, decisions could be said to be made. For convenience in reporting, the two kinds of decision-making are referred to below as D (formal, legitimate authority to decide) and D(RC) (decision-making in the sense that a person recommends with the certainty of his recommendation's being accepted).

As might be expected the total scores in every school were lower when they expressed levels of D(RC) decision-making than the original scores which expressed levels of formal decision-making. The range of raw scores for D(RC) was from 36 to 50 as against a range of scores for D of 41 to 52, and the distribution pattern showed a higher concentration of schools in the lower score ranges. The raw score mean dropped from 47 (D) to 41.10 (D(RC)).

The Autonomy scores in terms of D(RC) decisions rose so that the Edmonton Public schools reported five of the fourteen decisions as being taken at the school level and the Edmonton Separate schools eight. The West Riding schools reported seven or eight decisions at the level of headmaster or below and ten decisions at the level of board of governors or below.

When the D(RC) scores were calculated to express the level of in-school decision-making the range was slightly less than in the case of the D scores, being from 1.20 to 2.00. Two schools reported that the decision-making authority for all in-school decisions (D(RC)) was retained by the principal.

The Size of the Supportive Component

The supportive component was taken to consist of all employees in a school who were not teachers or administrators holding teaching certificates. The Size of the Supportive Component was measured by the computation of personnel ratios and not by means of a specially adapted or constructed instrument. A description of the variable is included here in order to present a complete picture of all the structural variables studied.

The personnel figures supplied by schools showed that, although there was variation between schools in the proportion of employees who belonged to the supportive component, there was greater variation in certain sectors of it. Accordingly, for some comparisons it was useful to distinguish between clerical staff, caretaking staff, and other ancillary staff.[23]

The overall supportive component. The size of the overall supportive component was expressed as a percentage of the total number of employees (in full-time equivalents) in each school. This percentage, which was regarded as a score, ranged from 19.2 to 32.1 over the whole sample. The distribution of scores was irregular with the modal scores being in the range of 22.6 to 23.5, but with half the schools scoring over 23.5.

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[23] "Other ancillary staff" included laboratory assistants, library aides, audio-visual technicians, husbandmen, laundry staff and nursing and kitchen staff if they were employed by the school system. Nurses and kitchen staff employed by a different authority and seconded to the school were excluded, as were unpaid volunteer aides.

Sectors of the supportive component. When the supportive component was considered in terms of its three constituent sectors (clerical, caretaking, and other ancillary staff) it became apparent that there were considerable differences in the ways in which schools used support staff. Two pairs of schools may be cited as an example.[24] Schools 5 and 16 showed approximately the same proportions of staff in their overall supportive components but, whereas the other ancillary staff in School 5 constituted only 1.6 percent of the total number of employees, those in School 16 constituted 6.3 percent. Even more striking was the contrast between Schools 11 and 18, for in the former school other ancillary personnel made up 1.9 percent of total employees and in the latter they made up 10.7 percent. Differences of the same order existed in these schools in their clerical establishments, although the proportions of staff in their caretaking sectors were similar. The responses from other schools showed similar, if less marked, differences in the make up of the supportive component and these are discussed below and in Chapter 8 in the context of an examination of the relationships between variables.

Profiles of Administrative Structure

The administrative structures of the schools can be concisely illustrated by the use of profiles which incorporate the variables.

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[24] See Appendix C.

discussed above and which permit a visual comparison of the degree to which different variables are present in a school.

The profiles of administrative structure in the schools of the present sample are shown in Figure 4. They were constructed using the standardized scores on Functional Specialization ($b^2 + ai$), Formalization of Role Definition (school items), Concentration of Authority (total score) and the three elements of the supportive component. The differences and similarities which emerge from a comparison of these profiles are discussed in Chapters 8 and 9.

Structure in the Workflow

The two sets of items measuring Diversification of Workflow in terms of Personalization and Acceptance both discriminated between the schools in the sample.

Although the whole sample means in both variables were similar (Personalization 26.4, Acceptance 27.5), the patterns of scores were different both as to their range and their distribution. The range of scores on Personalization (17 to 36) was narrower than that on Acceptance (13 to 37) but the Acceptance scores were somewhat more evenly distributed. The frequency distributions in both variables are illustrated in Figure 3 (p. 175) which shows the marked bimodality of the Personalization scores and the smaller clusters of groupings in the Acceptance scores. The indications were that in the schools studied the workflow was markedly oriented either toward or away from Personalization, whereas intermediate degrees of Acceptance were more commonly structured.

Profiles of the schools' workflow structures in terms of these two dimensions are illustrated in Figure 5. The relationships between

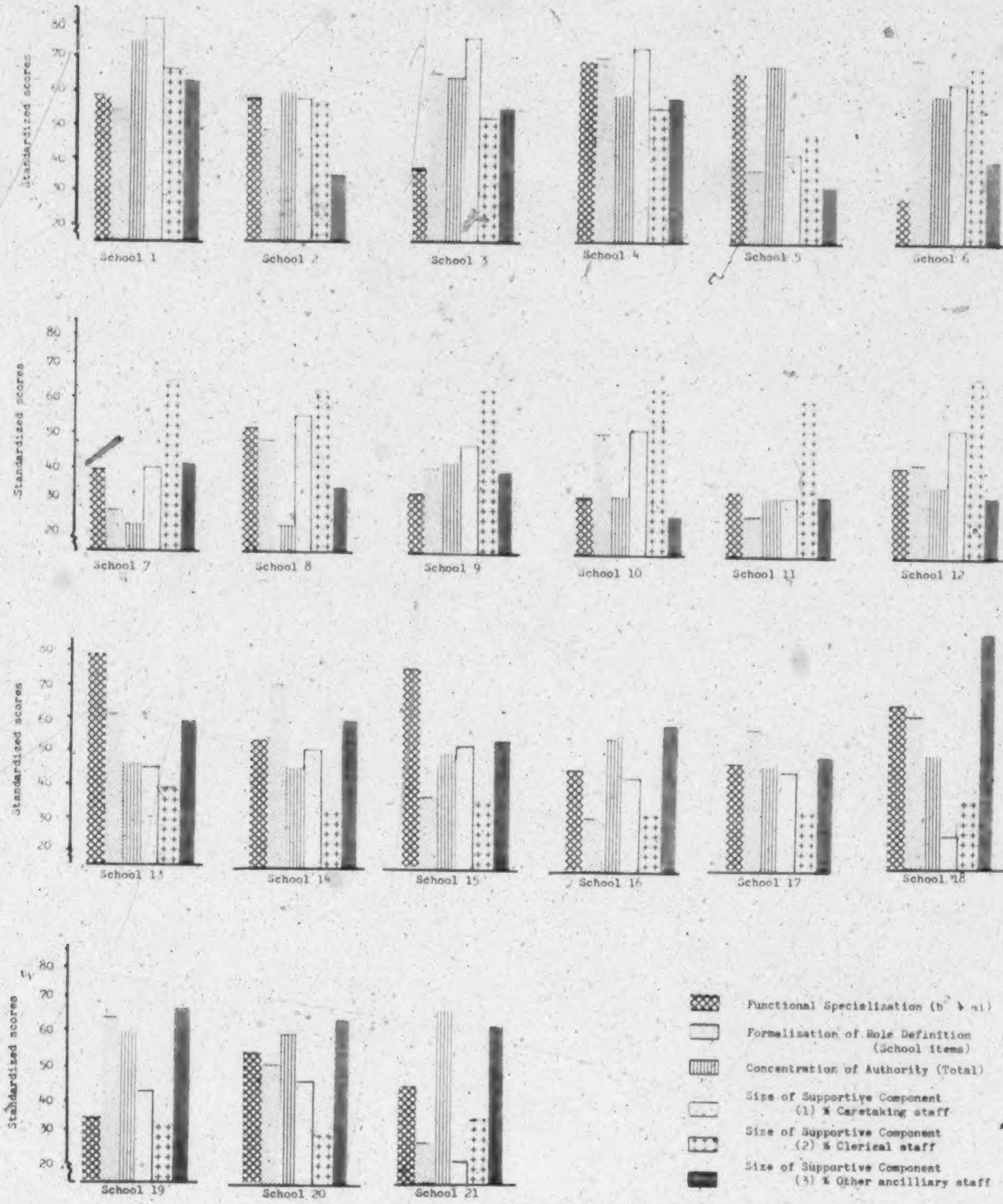

Figure 4

Profiles of Administrative Structure in Each of Twenty-one Schools

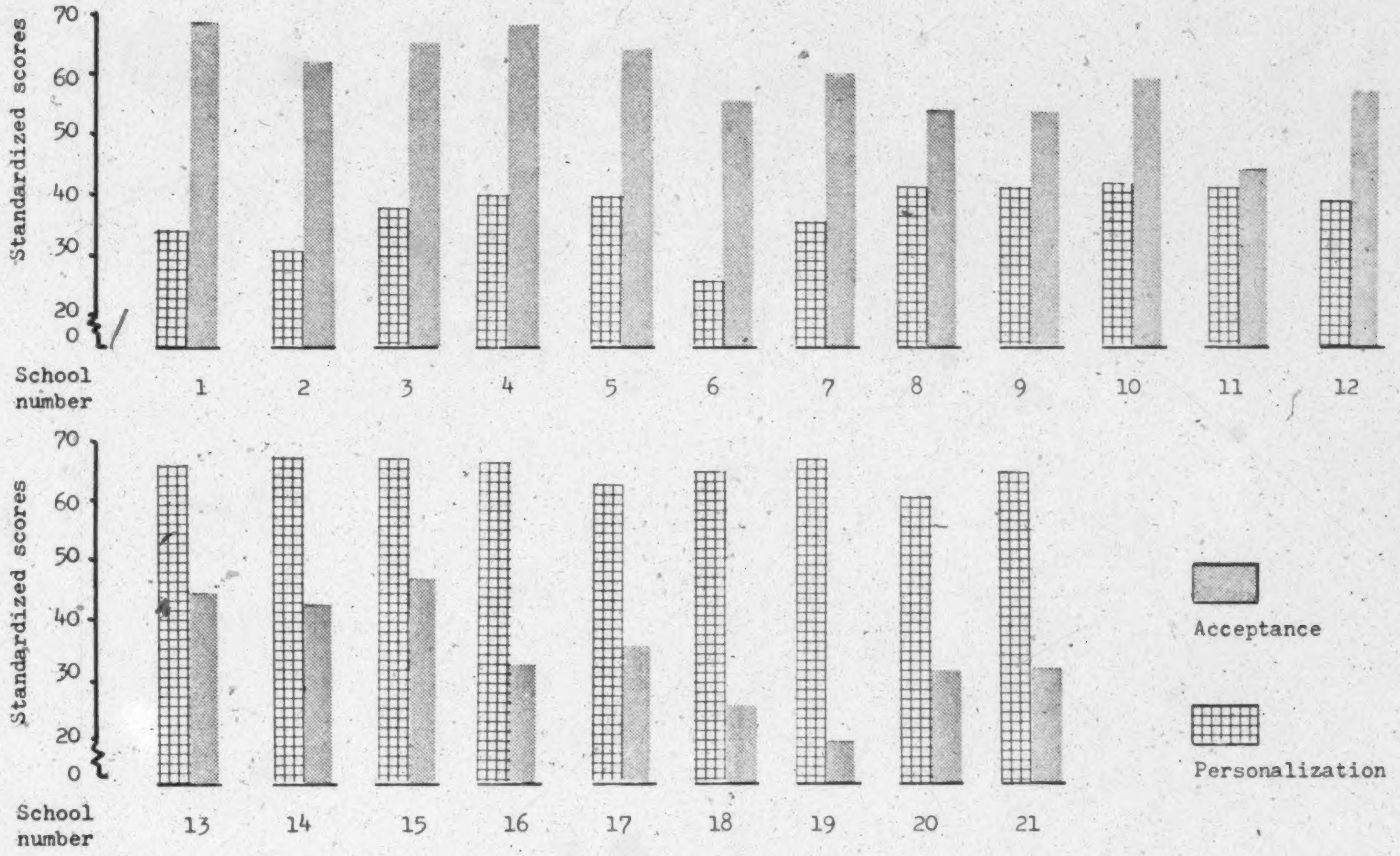

Figure 5

Workflow Diversification:
Profiles of Personalization and Acceptance

the dimensions and the differences between the schools are discussed below in Chapters 8 and 9.

THE RELATIONSHIPS BETWEEN THE VARIABLES

The testing of the relationships between the variables was performed in order to assess the external validity of the measures given by the adapted or constructed instruments. The following paragraphs describe the analysis undertaken and an assessment of the results instrument by instrument.

The Correlation Analysis

Spearman's rank correlation coefficient was used to examine the degree of association between the variables of Size and Administrative and Workflow Structure. Coefficients were calculated in three groupings of schools: (1) the whole sample, (2) the Alberta sub-sample, and (3) the West Riding sub-sample. Since it was possible that correlations observed in the Alberta sub-sample might mask different relationships between variables within either of the two systems in that sub-sample, a further analysis was performed which included the correlations within each of the two Alberta systems.

Fifteen variables were used and, with the exception of Size, they were those described in the preceding section. They were assigned identification numbers as follows:[25]

1. Size: number of pupils
2. Overall Size of Supportive Component

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[25] Correlations with the variables represented by D(RC) responses to the items in the Concentration of Authority instrument are not presented in this analysis. They are, however, included in Appendix D and the variables are further discussed in Chapters 8 and 9.

3. Percentage of Clerical staff
4. Percentage of Caretakers
5. Percentage of Other Ancillary Staff
6. Functional Specialization (b^2 + ai)
7. Functional Specialization (b.a.i)
8. Formalization of Role Definition (System)
9. Formalization of Role Definition (School)
10. Concentration of Authority (Total scores)
11. Autonomy (Principal and below)
12. Autonomy (Governors and below)
13. In-school Decision Level
14. Personalization
15. Acceptance

Of these fifteen, two (#8 and #12) were system variables which did not discriminate between schools in the single-system West Riding sub-sample. Hence the calculation of correlation coefficients using these variables was possible only in the whole sample and the Alberta sub-sample. One other variable (#11) discriminated between the two Alberta systems but not between different schools in either of those systems so that it could not be used in the calculation of correlation coefficients within either the E.P.S.D. or the E.S.S.D. Correlations with variable 11 were thus possible only in the whole sample and the Alberta and West Riding sub-samples. A complete list of the correlation coefficients obtained is located in Appendix D. A different presentation of the correlations which shows the school groupings in which they occurred is contained in Tables 16, 17 and 18 (pp. 188, 189, 194) and these tables are discussed in the following paragraphs.

The statistical significance of the correlations. The statistical design of the study[26] called for the rejection of the null hypothesis (of no association between variables) if the value of rho reached that required for significance at a probability level equal to or less than 0.05. In the three main groupings of schools ninety-three correlation coefficients met this criterion and they are summarized in Table 16 in a form which shows the school grouping in which each occurred. An important general observation about the results of this analysis is that very few of the correlation coefficients were consistently significant in all three groupings of schools. In particular, some of the correlations which might be expected if the instrument adaptations were valid, and if schools as organizations were comparable with the organizations in the Aston sample, did not yield coefficients at the desired level of significance in all three school groupings.

In order to assess how closely some of these coefficients approached the level required for significance a further analysis was undertaken to isolate those which reached significance at a probability level equal to or less than 0.10. This resulted in the addition of thirty-seven correlations to those listed in Table 16 and the 130 correlations whose coefficients were significant at $p \leq 0.10$ are summarized in Table 17.

In Tables 16 and 17 those correlations which gave rho values significant in all three of the main school groupings (whole sample, Alberta, West Riding) are shown in thicker squares. If the remainder

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[26] Summarized above in Table 4, p. 89

Table 16

Significant Intercorrelations ($p \leq 0.05$) Between Variables of Size, Structure and Technology in Three Groupings of Schools (a)

← Variable identification numbers →

Variables	1	2	3	4	5	6	7	8*	9	10	11	12*	13	14	15
1. Size No. of pupils				WS A					WS A	WS (A)					A
2. Overall Size of Supportive Component			WS	WS A	A				A WR		WS				WS
3. % Clerical Staff				WS		WR	WR				WS				WS
4. % Caretaking Staff					A		WR		WS A	A					$\boxed{\begin{array}{c}\text{WS}\\\text{A}\\\text{WR}\end{array}}$
5. % Other ancilliary staff	WR		WS							WS		WS		WS	
6. Functional Specialisation (b^2 + ai)							$\boxed{\begin{array}{c}\text{WS}\\\text{A}\\\text{WR}\end{array}}$				WR				A WR
7. Functional Specialisation (b:a.i)											WR				A WR
8. Formalisation of Role-Definition (System) *	WS A			WS A		WS					WS A	WS A		A	
9. Formalisation of Role Definition (School)								WS A							
10. Concentration of Authority (Total)	(WR)						WR	WS A							(A)
11. Autonomy (Principal and below)	A			A	WS				A	$\boxed{\begin{array}{c}\text{WS}\\\text{A}\\\text{WR}\end{array}}$		A		A	(WR)
12. Autonomy (Governors and below) *	A	WS	WS	WS A					A	A				WS A	
13. In-school Decision level									WS						
14. Personalisation		WS	WS	WS	A					A			WR		
15. Acceptance					WS WR			A		(WR)	(A)	WS A		WS	

(a) Note:

(i) Positive correlations shown above the diagonal, negative correlations shown below the diagonal

(ii) Significant ($p \leq 0.05$) correlations between two variables are indicated by letters denoting the group of schools in which the correlation was observed

(iii) Abbreviations: WS = whole sample, A = Alberta, WR = West Riding

(iv) * Denotes variables which did not discriminate in West Riding schools and for which no West Riding correlation coefficient was calculated

☐ Denotes significant correlation in all three school groupings

○ Denotes correlations whose direction was reversed in Alberta and West Riding sub-samples

Table 17

Significant Intercorrelations ($p \leq 0.10$) Between Variables of Size, Structure and Technology in Three Groupings of Schools (a)

	← Variable identification numbers →														
Variables	1	2	3	4	5	6	7	8*	9	10	11	12*	13	14	15
1. Size: No. of pupils	+ –	A		WS A					WS A	WS Ⓐ	ⓌⓇ				A WR
2. Overall Size of Supportive Component			WS	WS A	A	WR			WS A WR		WS				WS
3. % Clerical Staff				WS		ⓌⓇ	WR	A			WS A WR	A			WS WR
4. % Caretaking Staff					A	WR	WR		WS A	A					WS A WR
5. % Other ancilliary staff	WR		WS			WS			WS A	WS WR		WS		WS	Ⓐ
6. Functional Specialisation ($b^2 + ai$)			WS Ⓐ				WS A WR				ⓌⓇ				A WR
7. Functional Specialisation (b.a.i)											WR				A WR
8. Formalisation of Role Definition (System) *	WS A			WS A	A	WS A	WS				WS A	WS A		WS A	
9. Formalisation of Role Definition (School)								WS A		Ⓐ					A
10. Concentration of Authority (Total)	ⓌⓇ		WS A WR			WR	WR	WS A	ⓌⓇ						Ⓐ
11. Autonomy (Principal and below)	Ⓐ			A	WS A WR	Ⓐ			A	WS A WR		A		A	WS ⓌⓇ
12. Autonomy (Governors and below) *	A	WS	WS	WS A	A	A			A	A				WS A	
13. In-school Decision level									WS						
14. Personalization		WS	WS	WS	A					A			WR		
15. Acceptance					WS ⓌⓇ			WS A		ⓌⓇ	Ⓐ	WS A		WS A	+ –

(a) Note:

(i) Positive correlations shown above the diagonal, negative correlations shown below the diagonal

(ii) Significant ($p \leq 0.10$) correlations between two variables are indicated by letters denoting the group of schools in which the correlation was observed

(iii) Abbreviations: WS = whole sample, A = Alberta, WR = West Riding

(iv) * Denotes variables which did not discriminate in West Riding schools and for which no West Riding correlation coefficient was calculated

□ Denotes significant correlations in all three school groupings

○ Denotes correlations whose direction was reversed in Alberta and West Riding sub-samples of the correlations are examined, two important observations may be made. The first, which has already been mentioned, concerns the inconsistency in the levels of significance reached by the coefficients in different school groupings. The second is that some correlation coefficients were equally significant in the Alberta and West Riding sub-samples, but were in reverse directions, being positive in one sub-sample and negative in the other.

Since the purpose of the correlation analysis was to ascertain the external validity of the measures in terms of the consistent relationships they revealed between variables, it was important to determine whether these differences between sub-samples were explicable from the data or not. If no reasonable explanation was possible the validity of the measures could not be established.

In the case of those correlation coefficients which were significant in only one or two groupings of schools two explanations were possible. First, it might be that the arbitrary selection of a significance level led to the omission on Table 16 or 17 of a correlation whose coefficient approached significance. That this was the case with the application of the 0.05 significance level can be seen from a comparison of the two tables: the reduction of the significance level from 0.05 to 0.10 enabled the isolation of a further four correlations whose coefficients were significant at the lower level of probability in all three groupings of schools. It was therefore considered possible that, perhaps because of the small sub-sample sizes, correlations which were in the right direction and might show some measure of similarity between sub-samples were not apparent when the cut-off of a given probability level was applied.

A second explanation might be that a given correlation, rather than indicating a true relationship between two variables, was incidental and emerged because of the influence of other variables. Thus the positive correlation at $p \leq 0.05$ between Percentage of Caretakers and Concentration of Authority and the negative one between Percentage of Caretakers and Autonomy both occurred in the Alberta sub-sample only (Table 16) and probably reflected the generally observable negative correlation between Concentration of Authority and Autonomy.

This kind of explanation for some of the correlations which were observed in only one sub-sample can also be used to explain those correlations whose coefficients were equally significant but in a reverse direction in the two sub-samples. All these reverse-direction correlations proved to be amenable to this explanation and an example taken from Table 17 will show the logic involved. The table shows that Concentration of Authority (Variable 10) and Acceptance (Variable 15) were significantly and positively associated in the Alberta sub-sample and significantly and negatively associated in the West Riding sub-sample. There appears at first sight to be no ready explanation for either of these correlations. Further inspection of the table, however, reveals reversed correlations between Concentration of Authority and Size (Variable 1) in the two sub-samples. These two sets of correlations (Variable 1 with Variable 15 and Variable 10 with Variable 1) permit four statements:

1. In the West Riding schools with a lower degree of Concentration of Authority have a higher degree of Acceptance
2. In Alberta schools with a lower degree of Concentration of Authority have a lower degree of Acceptance
3. In the West Riding schools with a lower degree of Concentration of Authority are of a greater size

4 In Alberta schools with a lower degree of Concentration of Authority are of a lesser size.

These four statements permit a fifth:

5. In both Alberta and the West Riding larger schools have a higher degree of Acceptance.

Reference to Table 17 shows that the correlation between Size and Acceptance is positive and significant in both these sub-samples.

The application of this logic permitted an explanation of all the reverse-direction correlations shown in Tables 16 and 17. It also raised the question of which were the key correlations--that is, which set of correlations could be considered to provide an explanation for all other correlations. In order to answer this question the attempt was made to apply the logic to all variables. The failure of this attempt showed that the logic has severe limitations when applied to statements in which there is a probability, however small, of error. It also led to the further analysis, described below, which considered only the direction (positive or negative) of each correlation and not its statistical signficance.

The direction of the correlations. The way in which the logic described above may break down can be illustrated as follows:

The correlations for the whole sample listed in Table 17 permit three statements:

1. The higher the score on Formalization of Role Definition (System), the lower the Acceptance score
2. The higher the score on Formalization of Role Definition (System), the lower the score on Formalization of Role Definition (School)
3. The lower the Acceptance score, the lower the Percentage of Clerical Staff.

These statements appear to permit a fourth:

4. The lower the score on Formalization of Role Definition (School), the lower the Percentage of Clerical Staff.

This fourth statement can be neither confirmed nor rejected by an inspection of Table 17 since the correlation involved did not give a coefficient which reached the required significance level. Inspection of the coefficients however, (Appendix D) shows that the small observed correlation between these two variables in the whole sample was negative and that therefore the fourth statement could not be supported.

Thus the error inherent in a statement of probability makes for uncertainty in the interpretation of those correlations which were significant in just one or two groupings of schools. This uncertainty was unacceptable in view of the need to determine which variables showed consistent relationships. Accordingly, a further analysis was undertaken in which the focus was not upon the consistency of significant correlations only, but upon the consistency of the direction of the correlations.

The results of this analysis are contained in Table 18 which shows the direction of all correlations between the fifteen variables in five groups of schools--the whole sample, the Alberta and West Riding sub-samples and each of the two Edmonton school systems. The table shows thicker lines round those correlations which were consistently in a positive or negative direction in all five groupings of schools. When read in conjunction with Tables 16 and 17 it permits the isolation of those correlations whose consistency either of significance, or direction, or both enables statements about the relationships between variables and hence about the external validity of the measures. These correlations are discussed in the following

Table 18

The Direction of Correlations Between Variables of Size, Structure and Technology in Five Groupings of Schools

	← Variable identification numbers →														
Variables	1	2	3	4	5	6	7	8*	9	10	11**	12*	13	14	15
1. Size: No. of pupils		WS S P A	P S WR	☐ WS P S A WR	WS P A	WS A WR	WR		☐ WS P S A WR	WS P S A	WR		WS P S A	S WR	☐ WS P S A WR
2. Overall Size of Supportive Component	WR		☐ WS P S A WR	☐ WS P S A WR	P S A WR	P S A WR	P A WR		☐ WS P S A WR	A	WS WR			WR	WS P S A
3. % Clerical Staff	WS A			WS P S WR	P A	S WR	WR	☐ WS A	P S WR		☐ WS A WR	A	WS A WR	WR	WS S WR
4. % Caretaking Staff			A		P A	WS S A WR	☐ WS P S A WR		☐ WS P S A WR	WS P A	WS WR		P	S WR	☐ WS P S A WR
5. % Other ancilliary staff	S WR	WS	WS WR	WS S WR		WS P S A	WS P S A		WS P A WR	WS P A WR		WS	P	WS P	P A
6. Functional Specialisation (b² ÷ ai)	P S	WS	WS P A	P	WR		☐ WS P S A WR		WS A WR	WS P A	WR	WS	P WR	WS P	WS P A WR
7. Functional Specialisation (b.a.i)	WS P S A	WS S	WS P S A		WR				WS S A WR	WS P A	WR	WS	P WR	WS P S A	☐ WS P S A WR
8. Formalisation of Role Definition (System) *	☐ WS A	☐ WS A		☐ WS A	☐ WS A	☐ WS A	☐ WS A				☐ WS A	☐ WS A	☐ WS A	☐ WS A	
9. Formalisation of Role Definition (School)			WS		S	P S	P	☐ WS A		WS S A	WR		S	S WR	WS P S A
10. Concentration of Authority (Total)	WR	WS P S WR	☐ WS P S A WR	S WR	S	S WR	S WR	☐ WS A	P WR				☐ WS P S A WR	P S	WS P A
11. Autonomy (Principal and below) **	WS A	A		A	☐ WS A WR	WS A	WS A		WS A	☐ WS A WR		A	☐ WS A WR	A	WS WR
12. Autonomy (Governors and below) *	☐ WS A	☐ WS A	WS	☐ WS A	A	A	A		☐ WS A	☐ WS A	WS		☐ WS A	☐ WS A	
13. In-school Decision level	WR	☐ WS P S A WR	P S	WS S A	WS S A WR	WS S A	WS S A		WS P A WR					WS P S A	WS P WR
14. Personalization	WS P A	WS S A	WS P S A	WS P A	S A WR	S A WR	WR		WS P A	WS A WR	WS WR		WR		P WR
15. Acceptance		WR	P A		WS WR	S		☐ WS A	WR	S WR	A	☐ WS A	A S	WS S A	

Note:

(i) Positive correlations shown above the diagonal, negative correlations below the diagonal

(ii) Correlations shown by letters to indicate the school grouping in which they were observed: WS = whole sample, A = Alberta, WR = West Riding, P = EPSD, S = ESSD

(iii) * Denotes variables which did not discriminate in West Riding, EPSD or ESSD school groupings and for which correlation coefficients were calculated only in Whole sample and Alberta

** Denotes variable which did not discriminate in EPSD or ESSD and for which correlations were calculated only in Whole sample, Alberta, and West Riding groupings

☐ Denotes correlations whose direction was the same in all school groupings in which they were calculated paragraphs in the context of a discussion of the external validity of each of the measures.

Functional Specialization

Neither method of calculating a Functional Specialization score yielded correlations which were wholly satisfactory as confirmation of the external validity of the measure. In the Aston study Functional Specialization gave significant correlations with Size, Overall Formalization, Size of Supportive Component, Percentage of Clerks, Autonomy and Overall Centralization (Pugh et al., 1968:83). All were positive correlations except that with Centralization. In the present study the correlations between Functional Specialization and these variables or their equivalents were less clear cut and, with one exception, did not reach a significance level of 0.10.

Neither did the results clearly indicate which of the two formulae for the calculation of a Functional Specialization score was the more valid. However, since the preferred formula ($b^2 + ai$) gave results which were somewhat closer to the relationships observed in the Aston sample in the correlations with Size, Formalization and Size of Supportive Component, and since this formula also proved more useful in the later analysis of differences between local systems and geographic locations, there appeared to be insufficient grounds for its rejection in favour of the alternative (b.a.i). Accordingly, the following paragraphs refer to the results obtained using the preferred ($b^2 + ai$) formula.

A positive correlation with Size was strong in the Aston sample but was observed in the present sample only in the directional analysis. This showed the association in the whole sample and both the Alberta and

West Riding sub-samples. When the two Edmonton systems were analyzed separately, however, each showed a negative correlation between these variables.

The correlation with Formalization of Role Definition appeared to be more consistent. A significant (p = 0.10) negative relationship was found between Functional Specialization and Formalization at the system level in both the whole sample and the Alberta sub-sample. Although the association could not be tested in the single-system West Riding sub-sample, the relationship was also suggested in the directional analysis which showed a positive association between Functional Specialization and the obverse of system Formalization, Formalization at the school level, in all three main school groupings.

The positive correlation noted in the Aston sample with the Size of Supportive Component was observed in the present study in all school groupings except the whole sample, although only in the West Riding sub-sample did it reach significance (p = 0.10). In the case of the associations between Functional Specialization and Percentage of Clerks, Concentration of Authority and Autonomy, significant correlations confirmed those of the Aston study only in the West Riding sub-sample.

In view of these findings, the external validity of the measure of Functional Specialization could not be regarded as clearly established in the same way as in the Aston studies. To some extent, however, the measure did give consistent results, notably in the associations observed with Size and Formalization in the three main groupings of schools, and with Size of Supportive Component in all groupings except the whole sample. A further discussion of the implications of these findings is given in the final section of this chapter.

Formalization of Role Definition

In the Aston study Formalization of Role Definition was a sub-scale of Overall Formalization and Pugh et al. (1968:83) report only correlations with the overall scale. The Aston correlations, therefore, are of less value in confirming the external validity of this measure than they were in the case of Functional Specialization. Moreover, the position is complicated by the presence in this study of two Formalization scores, one measuring Formalization of Role Definition at the local system level, the other at the school level.

In spite of these difficulties the two measures used in the study showed correlations which suggested a fair degree of external validity. The correlation between system and school Formalization could not be calculated in the West Riding sub-sample but was significant (p = 0.025) and negative in both the whole sample and the Alberta sub-sample. Similar findings were observed for the correlation between Formalization at the sytem level and the total score on Concentration of Authority, and in this case the correlation gave a coefficient significant at p = 0.0005. These findings appeared to indicate logical relationships: in a system in which roles are more highly formalized at the system level the need for some formalization at the school level is less likely to be felt and, equally, a system in which decision-making authority is retained at higher levels is likely to have less need of a highly formalized set of role definitions since the exercise of discretion by subordinates is subject to ratification by their superordinates.[27]

In the case of Formalization at the school level positive correlations with Size were found in all groupings of schools. Those in the whole sample and the Alberta sub-sample were significant ($p= 0.05$). All school groupings also showed a significant ($p = 0.10$) positive correlation with Overall Size of Supportive Component and a positive correlation with Percentage of Caretakers (significant in the whole sample and the Alberta sub-sample at $p = 0.05$). Again, these relationships seemed logical and are not inconsistent with the Aston findings.

Concentration of Authority

Concentration of Authority in the Inkson et al. (1970a) abbreviated replication is a sub-scale of the original Aston measure of Centralization. The significant correlations reported by Inkson et al. concern relationships with variables not used in the present study and thus cannot be used as reference points here. The original Aston measure of Centralization correlated negatively with Autonomy, Size of Supportive Component, Formalization and Functional Specialization. The original Aston measure of Autonomy showed a positive correlation with Functional Specialization and negative correlations with Centralization and the Size of Supportive Component. The results of the correlation analysis in the present study were similar to, but less clear cut than those reported in the Aston work. In general, however, they appeared to support a claim for the external validity of the measure.

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[27] This interpretation has implications for the validity of the bureaucratic model which was questioned by the Aston researchers. C.f. below, p. 235(footnote).

Total scores. The significant negative correlation observed in all school groupings between Concentration of Authority and Autonomy was an inevitable result of the way the latter variable was scored. Apart from this expected correlation, the use of the total scores on the Concentration of Authority instrument gave significant negative correlations in all the main school groupings with Formalization of Role Definition at the system level (p = 0.0005) and with Percentage of Clerks (p = 0.10). No consistent correlations were obtained with Functional Specialization, but the directional analysis showed a consistent positive correlation between Concentration of Authority and the In-school Decision Level.

Autonomy. The correlations obtained with the two Autonomy scores (principal and below, governors and below) were not identical. Each score gave a significant negative correlation with one element of the supportive component (Percentage of Other Ancillary Staff in the one case (p = 0.10) and Percentage of Caretakers in the other (p = 0.05)). Both scores gave a positive correlation with Formalization at the system level but only the higher Autonomy score showed a consistent negative correlation with Formalization at the school level. Small positive correlations were observed in the directional analysis, in all groups for which they could be calculated, between both Autonomy scores and the In-school Decision Level.

The In-school Decision Level. This variable yielded no significant correlations with Size or any structural variable, although it was significantly (p = 0.05) and negatively correlated with Personalization in the West Riding sub-sample. The directional analysis revealed a consistent negative correlation between the In-school Decision Level and the Overall Size of Supportive Component, and consistent positive correlations with Formalization at the system level, Concentration of Authority and both Autonomy scores.

The Workflow Variables

Since the workflow variables of Personalization and Acceptance were newly developed in the present study there were no research results already existing which might suggest the kinds of correlation to be expected with Size or the variables of administrative structure. The strongest evidence for their external validity was the way in which they discriminated between local systems and geographic locations. This argument, however, anticipates the findings presented in the following chapter, and is not elaborated on here except for the observation that the way the variables discriminated between geographic locations was confirmed by the strong ($p = 0.0005$) negative correlation between them in the whole sample, but not in the other school groupings.

Of the two variables, Acceptance showed a greater number of consistent correlations. There was a significant ($p = 0.05$) positive association between Acceptance and Percentage of Caretakers in all three main school groupings and between Acceptance and Functional Specialization in the Alberta and West Riding sub-samples. The directional analysis revealed a consistent positive correlation between Acceptance and Size. In two of the school groupings (Alberta and the West Riding) this correlation was significant at $p \leq 0.10$. The variable was significantly ($p \leq 0.10$) and negatively correlated with Formalization at the system level and with Autonomy (at the level of governors and below) in all groups in which the correlation could be calculated.

The reverse was true of Personalization which gave significant positive correlations with these variables. The directional analysis showed Personalization to be negatively correlated with Concentration of Authority in the three main groups of schools and with Functional Specialization and Percentage of Other Ancillary Staff in the Alberta and West Riding sub-samples.

SUMMARY AND DISCUSSION

The foregoing sections have dealt with sub-problem 3 and have described the results obtained from the application of the instruments both in terms of the range and distribution of scores and of the relationships between variables. All instruments discriminated between the schools in the sample and the correlational analysis indicated a degree of external validity for all measures with the possible exception of Functional Specialization.

The instrument which measured Functional Specialization was the one which was changed in adaptation more than any of the others. Not only was the wording of items changed, but the whole concept of specialization was re-interpreted for this study. In view of this broad approach to the adaptation of the instrument two interpretations are possible for the less than satisfactory confirmation of its external validity. The first is that the measure is not really valid at all and that the adaptation was therefore unsuccessful. The second is that some validity has been demonstrated for the measure and that the absence of many of the associations found by the Aston researchers points to a dissimilarity between school organizations and the kind of organizations which made up the Aston sample.

Perhaps the strongest support for the first of these interpretations was given by the lack of a significant correlation between Functional Specialization and Formalization of Role Definition, and the consequent difficulty of arriving at a measure comparable with the Aston Structuring of Activities. Questions might also be raised about the concept of delegation as a tool for the measurement of division of labour in an organization.[28] However, a small positive correlation, although not significant was found in the three main groups of schools, between Functional Specialization and Formalization at the school level. As to the legitimacy of equating delegation with Functional Specialization, no alternative concept appears to exist which comes closer to the underlying concept of division of labour in the non-workflow aspects of school organizations.

Connected with this last argument is the second interpretation suggested above: that schools as organizations are in some way dissimilar to the kinds of organizations used in the Aston sample. The demonstrated internal consistency of the Functional Specialization instrument used here is an indication that it measures something. What it measures--the extent of delegation of non-workflow responsibilities--may be different from what is found in non-school organizations. What

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28. Child (1973:171), comparing the Aston results with those of other studies, sees the concept of delegation as used by Blau and Schoenherr (1971) as being a part of the Aston concept of Centralization. Following this equation would make a measure of delegation closer to that of Concentration of Authority in the present study than to Functional Specialization. However, although delegation of decision-making may indeed be seen in this way, the present study, in viewing delegation as a measure of division of labour was focussing on the delegation of tasks rather than of decisions. That the two aspects of delegation are not identical is a view which is supported by the present data which showed no consistent correlation between Functional Specialization (with its strong component of delegation) and the measures derived from the Concentration of Authority instrument.

is open to question is whether this dimension of delegation in schools is as important to an understanding of their administrative structure as the dimension of Functional Specialization is to an understanding of the administrative structure of non-school organizations. There appear to be some indications that it is not. One such indication lies in the fact that the variable yielded fewer consistent correlations than did any other. A second indication is given by an examination of the kinds of variables with which it was associated in contrast to the associations observed between some of the other variables.

The external validity of the other structural variables received greater confirmation than did that of Functional Specialization, both in terms of the number of consistent associations they showed and in terms of the similarity of those associations to those in the Aston sample. What is also noticeable about the other structural variables, however, is the strength of their association with a local system component. Thus, Formalization operates at both school and system levels; Autonomy is largely a matter of the decision levels established by local systems rather than by the schools themselves; and of the sixteen consistent correlations yielded by the Size of Supportive Component and its derived variables, eight were with system variables. Functional Specialization, however, gave only one consistent correlation with a system variable (Formalization at the system level). Of the other associations with Functional Specialization it may be observed that, while none were strong, the strongest were with those variables which focussed more on the school itself than on the local system (Size, Formalization at the school level, Overall Size of Supportive Component, and Acceptance).

The dimension of structure measured by the adapted Functional

Specialization instrument appears to be less salient than other dimensions. It may be so because of its relative independence from the effects of those variables which focus on the local system. To assert this is to assert the importance of an understanding of the local system in examining the administrative structure of schools. Whether this assertion is justified can better be seen in the light of the results of an analysis of the effects of the two other variables considered in this study, the local system and the geographic location. These results are described in the following chapter.

Chapter 8

THE INSTRUMENTS AS COMPARATIVE TOOLS: THE VARIABLES OF LOCAL SYSTEM AND GEOGRAPHIC LOCATION

This chapter deals with sub-problem 4 which was stated in two parts, referring to relationships between the size, structure and workflow variables and the variables of Local System and Geographic Location. The analysis is presented in two sections dealing respectively with the Local System and the Geographic Location of the schools, and a third section examines the relative importance of each.

The Kruskal-Wallis one-way analysis of variance was used to assess the extent to which the average scores on each variable differed in the schools grouped by local system. This analysis was complemented by the Wald-Wolfowitz runs test which assessed the difference between the systems not only in terms of the average scores obtained, but also in terms of differences of any other kind. In order to examine the differences between geographic locations the schools were regrouped as the Alberta and West Riding sub-samples and the Mann-Whitney U test was applied to test for differences in central tendency between the two groups, while the Wald-Wolfowitz runs test of any other kind of differences was repeated for the new grouping.

THE DIFFERENTIATION BETWEEN LOCAL SYSTEMS

The results of the two analyses for each variable are presented in Table 19. The first column of the table reports the results of the Kruskal-Wallis one-way analysis of variance and shows, for each variable, the value of H and an indication of its significance level. The statistical design of the study called for the rejection of the null hypothesis (of no significant difference between the average scores in the three local systems) if the value of H reached that required for significance at $p \leq 0.05$. Five variables gave values of H which were lower than the criterion value. Accordingly the null hypothesis could not be rejected in the case of these variables--Size, Functional Specialization, Formalization of Role Definition (at the school level) and the In-school Decision Level both as formally specified (D) and as practically observed (D(RC)). In the case of all other variables the value of H was such as to permit the rejection of the null hypothesis at levels of confidence between 0.02 and 0.001.

Since this test does not indicate exactly where the difference between average scores lies it was not possible to judge whether all three systems obtained significantly different scores or whether the difference resided in any two out of the three systems. The Wald-Wolfowitz test, however, is a test which may be used on only two samples at a time, so that the results permit more exact statements about where differences were found. These results are shown in the right hand section of Table 19. Again, the variables of Size, Functional Specialization, Formalization at the school level and the two In-school Decision Level scores did not discriminate between any of the pairs of local systems. All other variables gave results which permitted the rejection of the null hypothesis for one or more pairs of systems.

Most variables referring to the ratio of support staff

Table 19

The Kruskal-Wallis and Wald-Wolfowitz Tests of Differences between Local Systems in Variables of Size, Structure and Technology

Variables	Kruskal-Wallis H EPSD/ESSD/WRCC	Wald-Wolfowitz No. of runs		
		EPSD/ ESSD	EPSD/ WRCC	ESSD/ WRCC
Size: No. of pupils	4.77	6	9	5
Overall Size of Supportive Component	11.26 **	5	4 *	2 *
% Clerical Staff	15.44 ***	6	2 *	2 *
% Caretaking Staff	7.92 *	4	4 *	6
% Other Ancillary Staff	11.55 **	8	4 *	2 *
Functional Specialization (b^2 + ai)	5.52	5	8	6
Formalization of Role Definition (System)	20.00 ***	2 *	2 *	2 *
Formalization of Role Definition (School)	4.73	6	(?)	6
Concentration of Authority (Total score (D))	15.29 ***	2 *	(?)	2 *
Autonomy (principal and below (D))	13.43 **	2 *	4 *	2 *
Autonomy (governors and below (D))	20.00 ***	2 *	2 *	2 *
In-school Decision Level (D)	1.42	8	8	(?)
Concentration of Authority (Total score (D(RC))	12.92 **	2 *	2 *	(?)
Autonomy (principal and below (D(RC))	16.93 ***	2 *	2 *	(?)
Autonomy (governors and below (D(RC))	20.00 ***	2 *	2 *	2 *
In-school Decision Level (D(RC))	2.15	7	7	(?)
Personalization	16.66 ***	(?)	2 *	2 *
Acceptance	16.16 ***	4	2 *	4 *

* Significant p = 0.05

** Significant p = 0.01

*** Significant p = 0.001

(?) Indeterminate

discriminated between the Edmonton systems and the West Riding, although the Percentage of Caretakers showed a significant difference only between the Edmonton Public system and the West Riding. None of the support staff ratios was significantly different in the two Edmonton systems. Formalization of Role Definition at the system level was significantly different in all three systems. The variables of Concentration of Authority and Autonomy gave slightly different results according to whether they represented D or D(RC) responses to the instrument. In the former case Concentration of Authority was not significantly different in the Edmonton Public and West Riding systems. In the latter case neither Concentration of Authority nor Autonomy (principal and below) was significantly different in the Edmonton Separate and West Riding systems. Neither dimension of workflow structure was significantly different in the two Edmonton systems, but each discriminated between these systems and the West Riding.

In summary, both as to averages and as to other properties of the scores, thirteen variables differed significantly in at least two of the three local systems represented by the sample. Although the Kruskal-Wallis analysis could not indicate where the differences between systems lay, some indications emerged from the Wald-Wolfowitz test as to which variables differed between the geographic locations and which differed chiefly between the local systems. A more certain indication was provided by the tests described in the following section.

THE DIFFERENTIATION BETWEEN GEOGRAPHIC LOCATIONS

The results of the Mann-Whitney U test and the Wald-Wolfowitz runs test applied to the schools grouped according to their geographic location are shown in Table 20. The first column of the table reports the results of the Mann-Whitney test and shows, for each variable, the value of U and an indication of its significance level. Eight variables yielded values of U which were not significant at $p \leq 0.05$ and hence did not permit the rejection of the null hypothesis. These variables were Size, Functional Specialization, Formalization of Role Definition at both system and school levels, Concentration of Authority (D), Autonomy at the level of principal and below (D(RC)) and the In-school Decision Level for both D and D(RC) responses. The ten other variables gave values of U which permitted rejection of the null hypothesis at confidence levels ranging from 0.025 to 0.001.

The Wald-Wolfowitz runs test gave the slightly different results shown in column 2 of Table 20. Of the eight variables noted above whose average did not differ significantly in Alberta and the West Riding, one (Formalization at the system level) showed a significant difference when this second test was applied. Three of the variables whose average scores did differ significantly in the two sub-samples (Percentage of Caretakers, Autonomy (D) at the level of principal and below, and Concentration of Authority (D(RC))) failed to show a significant difference on the Wald-Wolfowitz test.

These different results are clearly explicable from the data. The system Formalization scores were: E.P.S.D. 8, E.S.S.D. 11, W.R.C.C. 9. The Alberta average was 9.5--very close to the W.R.C.C. average. The distribution of scores in the Alberta sub-sample, however, was different from the single score in the West Riding, a difference which is picked up by the Wald-Wolfowitz test. In the case of the other three

Table 20

The Mann-Whitney U and Wald-Wolfowitz Tests of Differences between Geographic Locations in Variables of Size, Structure and Technology

Variables	Mann-Whitney U	Wald-Wolfowitz No. of runs
Size: No. of pupils	48.0	9
Overall Size of Supportive Component	7.0 ***	4 *
% Clerical Staff	0.0 ***	2 *
% Caretaking Staff	23.5 *	(?)
% Other Ancillary Staff	9.5 ***	4 *
Functional Specialization ($b^2 + ai$)	33.0	10
Formalization of Role Definition (System)	54.0	3 *
Formalization of Role Definition (School)	47.5	12
Concentration of Authority (Total score) (D)	46.5	(?)
Autonomy (principal and below) (D)	24.0 *	(?)
Autonomy (governors and below) (D)	0.0 ***	2 *
In-school Decision Level (D)	51.0	(?)
Concentration of Authority (Total score) (D(RC))	20.0 **	(?)
Autonomy (principal and below) (D(RC))	33.0	(?)
Autonomy (governors and below) (D(RC))	0.0 ***	2 *
In-school Decision Level (D(RC))	45.0	(?)
Personalization	0.0 ***	2 *
Acceptance	1.5 ***	4 *

* Significant p = 0.05

** Significant p = 0.01

*** Significant p = 0.001

(?) Indeterminate

variables, the results of the Wald-Wolfowitz test were indeterminate owing to the presence of tied scores across the two sub-samples. The attempt to deal with these ties in the manner suggested by Siegel (1956: 143-144) was inconclusive and, although in each variable one method of counting the number of runs gave a significant result, other methods did not. The significance of the difference between scores in each sub-sample therefore could not be stated with confidence.

In the case of the remaining seven variables whose average scores differed significantly in the two sub-samples, the Wald-Wolfowitz test confirmed a significant difference. It was therefore possible to view the variables of Overall Size of Supportive Component, Percentage of Clerical Staff, Percentage of Other Ancillary Staff, Autonomy at the level of governors and below, Personalization and Acceptance as the variables which differed significantly in the Alberta and West Riding sub-samples.

THE LOCI OF DIFFERENTIATION

The results described above permitted a classification of the variables used in this study according as to whether they differentiated primarily between schools, between local systems, or between different geographic locations. In the case of the latter category the classification is necessarily tentative, since the West Riding schools represented only one system and it is arguable that, while the evidence may support statements about the variables which discriminate between systems, it could not support statements about the discrimination between geographic locations without the addition of data concerning a second British school system. In the absence of such data two indications were used to substantiate the classification of a variable as one whose main impact was in the differentiation between geographic locations: first, the value of the U statistic, and second, the presence or absence of a significant difference between the two Edmonton systems in the Wald-Wolfowitz runs test. If, for any variable, the value of U was such as to meet a more stringent level of probability than that revealed by the Kruskal-Wallis test of the difference between the local systems, and if, also, the variable showed no significant difference between the two Edmonton systems, then that variable was judged to have its main impact in discriminating between the geographic locations rather than between the local systems.

Table 21 lists the variables classified according to the area in which they primarily discriminated. In the case of three variables (Percentage of Caretakers, Autonomy at the level of principal and below (D) and Concentration of Authority (D(RC))) the classification is subject to some doubt. This is indicated in the table by the insertion of a question mark in parenthesis.

The variables whose main locus of differentiation appeared to be within the school itself were Size, Functional Specialization, Formalization of Role Definition at the school level and the In-school Decision Level for both D and D(RC) responses. Differentiation at the system level was given by Concentration of Authority, Autonomy at the level of principal and below, Formalization at the system level and Percentage of Caretakers. Those variables whose main locus of differentiation seemed to be at the level of geographic location were Autonomy at the level of governors and below, the Overall Size of Supportive Component, Percentage of Clerical Staff, Percentage of Other Ancillary

Table 21

A Classification of the Variables of Size, Structure and Technology according to the Areas of Their Primary Differentiation

Variables differentiating primarily between geographic locations	Variables differentiating primarily between local systems		Variables differentiating primarily between schools
Overall Size of Supportive Component	% Caretaking Staff	(?)	Size: No. of pupils
% Clerical Staff	Formalization of Role Definition (System)		Functional Specialization
% Other Ancillary Staff	Concentration of Authority (Total score) (D)		Formalization of Role Definition (School)
Autonomy (governors and below) (D)	Concentration of Authority (Total score) (D(RC))	(?)	In-school Decision Level (D)
Autonomy (governors and below) (D(RC))	Autonomy (principal and below) (D)	(?)	In-school Decision Level (D(RC))
Personalization	Autonomy (principal and below) (D(RC))		
Acceptance			

Staff, and the two workflow variables of Personalization and Acceptance.

Of those variables for which the classification was doubtful, one (Percentage of Caretakers) distinguished mainly between the Edmonton Public and the West Riding systems. Since, however, the results of the Wald-Wolfowitz test were indeterminate, and since the value of U in the Mann-Whitney test was not such as to indicate a greater discrimination between geographic locations than between systems, it was classified as a system variable. The question of its exact locus of differentiation, however, remained doubtful, particularly in view of the way in which the other variables of support staff ratios discriminated between geographic locations rather than between systems. The other two doubtful classifications (Concentration of Authority (D(RC)) and Autonomy (D) at the level of principal and below) also gave indeterminate results on the Wald-Wolfowitz test of differences between geographic location, but both discriminated between the two Alberta systems and were accordingly placed in the area of system differentiation.

The question raised at the end of the preceding chapter as to the importance of variables relating to the local system in understanding the organizational structure of schools became clearer as a result of this analysis. All three of the elements of administrative structure defined at the beginning of this study contained components whose main locus of differentiation appeared to be at the system level. This finding has implications for the comparative study of school organizations. These implications can be incorporated into a revision of the proposed model of organizational constraints which formed the basis of the theoretical design of the study. This revision constitutes the subject matter of the following chapter.

Chapter 9

THE REVISED GENERAL MODEL:
THEORETICAL AND PRACTICAL IMPLICATIONS

Sub-problem 5 refers to the revision of the proposed model of organizational constraints on classroom processes which was introduced in Chapter 3. In the course of the study it became apparent that the model needed review not only in terms of the relationships among the variables, but also in terms of the variables themselves. Some assessment was also needed of the value of the model in comparative studies. This chapter deals with these problems and consists of four sections. The first contains a critical review of the variables, and the second a revised version of the model. The third section presents an evaluation of the model and discusses some of its theoretical implications. The fourth section constitutes an attempt to use the model in a comparison of the Edmonton and West Riding school systems and to point to some of the practical implications of the comparison.

THE REVISED VARIABLES

The proposed general model, in its expanded form (Figure 2, p. 58), included five variables of school administrative structure and six of technology or workflow structure. These eleven variables became the seventeen variables of administrative and workflow structure described in the preceding chapters, and they became so not only as the result of expansion, but also of contraction, both processes resulting from empirical analysis.

Contraction occurred in the refinement of the Diversification of Workflow instrument and in the removal of the composite Aston variable, Structuring of Activities. Expansion was largely the result of the analysis of the data derived from the Concentration of Authority instrument and the data concerning personnel ratios. The isolation of two sets of items to measure Formalization of Role Definition also added one extra variable.

A consideration of the variables in terms of their inclusion in the revised model, however, raised questions about the suitability of the seventeen as a set. Particularly was this so in the case of those variables which resulted from the expansion of the original variables. Not only was their terminology in many cases clumsy, it was possible that it did not always accurately reflect what was represented by the variable. The question has already been raised (Chapter 7) of what is measured by Functional Specialization. Similar questions arose in a consideration of those variables representing D(RC) responses to the Concentration of Authority instrument and a further question might be raised as to value, in a comparative model, of the variable Autonomy (at the level of governors and below). In view of these considerations the variables were critically reviewed and, in some cases, renamed.

Functional Specialization

Some questions raised by the results of the adaptation of the Functional Specialization instrument have already been discussed (pp. 201-204). The retention of the Aston terminology for what proved to be a dimension of school structure with few of the characteristics of the Aston variable seemed of doubtful value and could even be misleading, since in school organizations the word "specialization" has a distinct meaning (that of subject area specialization) which is very different from the meaning attached to the word in the Aston studies. For these reasons there seemed to be good grounds for renaming the variable as it was used in the present study. What the adapted instrument measured was the degree of specificity and intensiveness of delegation in non-workflow elements of the school (c.f. pp. 96-97) and therefore the variable was renamed Delegation.

Formalization of Role Definition

The emergence in this study of two sets of items measuring different levels of formalization marks an important difference from the Aston findings. What the items measured, however, was essentially similar to that measured by the Aston instrument, so that a change of name may be considered inappropriate. The approach taken was to let the description of the locus of formalization precede the title of the variables and they were labelled System Formalization of Role Definition and School Formalization of Role Definition.

Concentration of Authority

The responses to the Concentration of Authority instrument led to the greatest expansion of the original variables and resulted in the analysis of eight variables: Concentration of Authority (D), Autonomy at the level of principal and below (D), Autonomy at the level of governors and below (D), In-school Decision Level (D) and the four variables of the same names which were measured using the D(RC) responses to the instrument.

Of these eight variables, those which represent D(RC) responses were not strictly measures of the locus of decision-making at all in the Aston sense, since they did not refer to legitimate, formal decision-making authority. They did, however, indicate an aspect of the reality of the schools studied. They did this less in themselves than by the comparison they afforded with the legitimate, formally established levels of decision-making--in essence, what was interesting about them was not the scores they yielded but the difference between those scores and the scores given by the D responses. What this difference appeared to represent was the amount of discretion permitted to the lower echelons of staff in decision-making.

Thus, for example, items 5 and 6 in the Concentration of Authority instrument (The appointment of a department head; the appointment of a teacher) are decisions which were made formally in all three systems above the level of the school, but in the sense that recommendations could be made with the certainty of their being accepted, the decisions for these two items in both the Edmonton Separate and West Riding schools were taken at lower levels--by the principal in the Edmonton Separate schools and by the board of governors in the West Riding schools. In these two systems principals or governors respectively appeared to have greater discretion in the appointment of department heads and teachers than did principals in the Edmonton Public system.

The decision was therefore taken to introduce into the model a variable called Discretion which was measured by the difference between the D and D(RC) scores. As a variable the element of Discretion was not tested or analyzed in conjunction with other variables. Rather, it was inserted as a potentially useful guide to further development of the model. The present data, however, permitted two statements about the variable. First, since it resulted from what was allowed to happen in any given system, it discriminated between systems rather than schools. In the sample studied, the geographic location of the systems also had an important effect on the amount of discretion permitted, as may be seen from a comparison of the mean differences in Concentration of Authority (total scores) measured by D and D(RC) responses: E.P.S.D., 2.2; E.S.S.D., 4.0; W.R.C.C., 9.6.[29] Second, since discretion measures like these referred to the total Concentration of Authority scores, they may include discretion allowed to the central office staff of the local system as well as that permitted at the school level. Since the main focus of the present study was on the organizational structure of the schools themselves, it seemed more meaningful to concentrate on the discretion permitted at the school level. This focus was given, not by a comparison of the two sets of total Concentration of Authority scores, but of the two sets of Autonomy scores at the level of principal and below. This meant that for any given school, Discretion could be defined by the difference between the number of decisions which could legitimately be taken at the school level and the number of decisions at that level which could be made by a recommendation which was certain of acceptance. Thus Discretion may be regarded as a feature of school organizations which is controlled by patterns of decision-making used in the local system.

The decision to use the two sets of Autonomy scores (at the level of principal and below) to determine the degree of Discretion was complemented by the decision to omit from further consideration the other three sets of D(RC) scores. The reason for the non-use of those relating to the total Concentration of Authority score has been given above. The rejection of the scores measuring Autonomy at the level of governors and below is discussed below. The use of the difference between the D and D(RC) scores representing the In-school Decision Level was considered relatively meaningless since it appeared from the data that it merely reflected the assumption by the principal of responsibility for those decisions which could be made at the school level when the criterion of "recommend with certainty" was used.[30]

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[29] See Appendix C. These figures were obtained by mean Concentration of Authority (D) minus mean Concentration of Authority (D(RC)). They do not, in themselves, represent any level of decision-making.

The addition of the Discretion variable and the deletion of three D(RC) variables reduced the number of variables stemming from the Concentration of Authority instrument to five: Concentration of Authority (total score), Autonomy (principal and below), Autonomy (governors and below), In-school Decision Level and Discretion. Further refinement led to the renaming of Concentration of Authority (total score) and the elimination of Autonomy (governors and below).

In the Inkson et al. abbreviated replication of the Aston work the structural dimension of Concentration of Authority was represented only by the measure of Lack of Autonomy: an organization's score was the number of decisions from the set list which were taken outside the organization. In the present study the additional use of the total scores on the set of items made the Concentration of Authority score more akin to the original Aston Centralization measure than to the

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30. See Appendix C. In all cases except five the In-school Decision Level remained the same or rose when D(RC) responses were considered.

composite Concentration of Authority dimension. Accordingly the decision was taken to relabel the present variable of Concentration of Authority as Centralization. Although the set of items which yielded the scores on this variable were adapted not from the original Centralization scale, but from its sub-scale, Autonomy, two reasons justified the reversion to the original Aston label. First, the sub-scale of Autonomy in the Aston work gave results which correlated highly with the overall Centralization scale (Pugh et al., 1968:83); second, the fact that, in the present sample, most decisions were taken outside the schools themselves seemed to indicate that Centralization ("the locus of authority to make decisions affecting the organization" Pugh et al., 1968:76) in the local system was an important factor in the understanding of the organizational structure of schools.

One of the ways in which its importance can be seen relates to the difficulty experienced in the present study in dealing with the delimitation of what constituted an in-school decision given that, from one point of view, the West Riding board of governors could be considered a part of the school organization. During the course of the analysis the formulation of two Autonomy scores (principal and below, governors and below) was useful in that it revealed differences between the Edmonton and West Riding systems which may not have emerged from the use of a single Autonomy score. For the purposes of revising the theoretical model, however, the presence of these two scores, one of which was inapplicable to the majority of the schools studied, was an impediment. The removal of this impediment was based on the view of Centralization as a system variable which represented decision-making practises used in the system and upon which the degree of Autonomy in individual schools depended. Thus the presence of the West Riding board of governors as a decision-making body may be seen as an aspect of the Centralization policies of the West Riding Local Education Authority rather than as a determinant of the degree of Autonomy in a given school. In the West Riding case--as in the case of all British education authorities--the inclusion of a board of governors as one locus of decision-making is the result of national legislation, so that the system's centralization policies are themselves affected by environmental constraints.

The variable, Autonomy (governors and below) was therefore eliminated from the set which was to be included in the revised model. Autonomy thus became unambiguous and referred to the number of decisions which could legitimately be taken by the principal or headmaster or other staff subordinate to him. The extent to which these decisions were concentrated at the top of the school hierarchy was assessed by the score representing the In-school Decision Level which was retained unchanged in the final set of variables.

The Variables of Supportive Component and Workflow

The variable of Overall Size of Supportive Component was retained unchanged as were its derived variables, Percentage of Clerical Staff, Percentage of Caretakers, and Percentage of Other Ancillary Staff. Similarily, the workflow variables of Personalization and Acceptance seemed adequate and were kept unchanged for inclusion in the revised model.

THE REVISED MODEL OF ORGANIZATIONAL CONSTRAINTS ON CLASSROOM PROCESSES

The revised model is presented in Figure 6. (p. 224). It incorporates all the variables which resulted from the refinements discussed in the preceding section and the consistent relationships between them which were analyzed and discussed in Chapter 7. The model differs in two main respects from the proposed model described in Chapter 3. First, it distinguishes between three kinds of relationships: those which seem likely to exist, but which were untested in the present study; those which the present analysis indicated but could not confirm; and those which were clearly indicated by the data. Second, the model reflects the findings of this study by repositioning some variables so that the locus of their operation can be better understood.

The model retains the four basic divisions proposed earlier: (1) the geographic location and its attendance socio-cultural and economic environment, (2) the three extra-school sources of variation: local system and size and type of school, (3) the variables which operate within the administrative and workflow structures of the school itself, and (4) the processes operating in the classroom. As in the earlier model the fourth dimension, classroom processes, remains as a conceptual element only and the nature of the relationships between the classroom and the other variables in the model is speculative. Also speculative are the relationships between the type of school and the other variables since all the data referred to schools of the same type (secondary schools as defined in this study) and thus could not indicate which variables might be affected by differences in type of school.

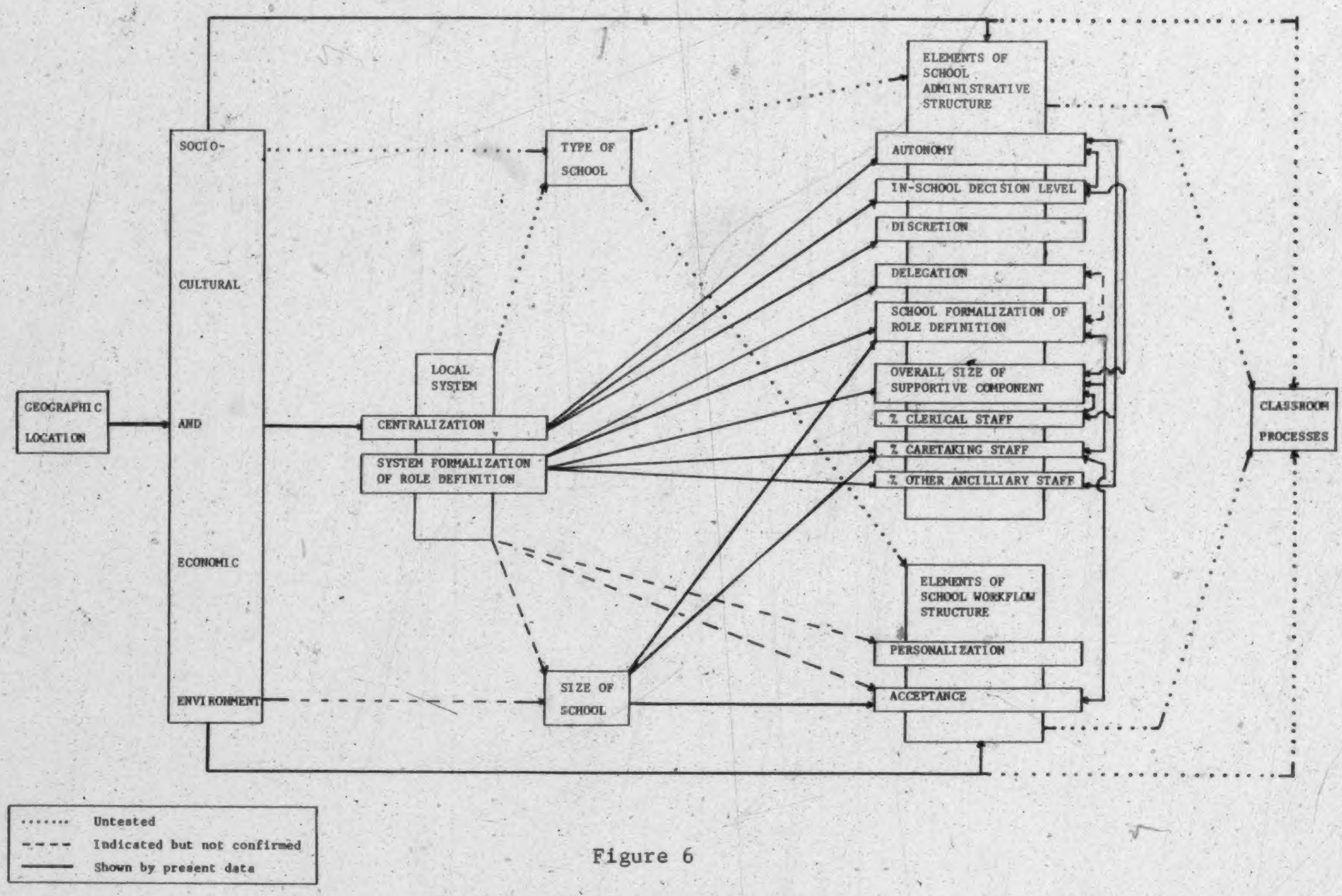
GEOGRAPHIC LOCATION
SOCIO- CULTURAL AND ECONOMIC ENVIRONMENT
LOCAL SYSTEM
CENTRALIZATION
SYSTEM FORMALIZATION OF ROLE DEFINITION
TYPE OF SCHOOL
SIZE OF SCHOOL
ELEMENTS OF SCHOOL ADMINISTRATIVE STRUCTURE
AUTONOMY
IN-SCHOOL DECISION LEVEL
DISCRETION
DELEGATION
SCHOOL FORMALIZATION OF ROLE DEFINITION
OVERALL SIZE OF SUPPORTIVE COMPONENT
% CLERICAL STAFF
% CARETAKING STAFF
% OTHER ANCILLIARY STAFF
ELEMENTS OF SCHOOL WORKFLOW STRUCTURE
PERSONALIZATION
ACCEPTANCE
CLASSROOM PROCESSES
Untested
Indicated but not confirmed
Shown by present data

Figure 6

The Revised Model of Organizational Constraints on Classroom Processes

The Socio-cultural and Economic Environment

The model suggests, on the basis of the evidence in this study, that the socio-cultural and economic environment of the school, which is peculiar to its geographic location, is an important determinant of the degree of Personalization and Acceptance observable in the structure of the school's workflow, and of the centralization policies of the local system. The environment also has a direct relationship with the school administrative structure in its apparent effect on the Overall Size of Supportive Component and the Percentage of Clerical and Other Ancillary Staff, and an indirect effect on the levels of Autonomy and Discretion in the school through its effect on local system decision-making structure (Centralization).

The Type and Size of School

As noted above the effect of the type of school was not examined in this study, so that any relationships shown in the model are speculative. Relationships could exist between the type of school and its administrative and workflow structures. Both the environment and the local system might be determinants of school type. The exploration of any such relationships could be a useful focus for further research, and it is for this reason that they are sketched in the model.

That the size of schools in a given system may be affected by local system policies was indicated to some extent by the present study. The indications, however, were not clear cut and rested largely upon the fact that, while average school sizes in the Alberta and West Riding sub-samples were not significantly different, the difference between mean school sizes in the two Edmonton systems approached significance.

However, since this difference may also reflect the smaller number of Roman Catholic taxpayers in the city, it is possible to conceive of a link between the environment and school size. The model indicates both these relationships.

Three other relationships with the size of a school are shown in the model: that with School Formalization, with Percentage of Caretakers, and with Acceptance. The relationship with Formalization confirms that found in the Aston studies, that with the Percentage of Caretakers highlights the way in which certain aspects of organizational structure may be masked by research which uses gross categories (e.g., "non-workflow personnel"). The relationship between Size and Acceptance sheds some light on the large school/small school debate which was prominent in both Britain and North America in the early years of the last decade. The model suggests a strong relationship between the size of a school and the minimizing of mechanisms to control students' behaviour out of class, but no relationship between Size and Personalization. A partial explanation in terms of expediency seems not implausible: the larger the school the more difficult it is to make rigid out-of-classroom controls work, but large size need not result in depersonalization.

The Local System

Although several previous studies have pointed to the importance of size as a determinant of aspects of bureaucratic structure, the present model suggests that it is not the most important of the variables which give an understanding of the organizational structure of schools. An examination of the correlations described in Chapter 7 indicates that, except for the relationships discussed above, the effect of school size is secondary to that of the local system in determining how a school is structured. This was seen particularly in an examination of the expected positive relationship between Size and Delegation (Functional Specialization) which, although positive in the whole sample and the two sub-samples, was negative in each of the Edmonton school systems.

The model suggests that the way in which the local system is structured has an important effect on the structure found in individual schools. The degree of Formalization at the system level was seen to be significantly and negatively associated with School Formalization, with Delegation, and with the Size of all Supportive Components except that of clerical staff. The system decision-making policies determine the degree of Autonomy in the school and are also closely associated with the Discretion and the In-school Decision Level observed in each school. The association between the local system and the structure of the workflow in each school is less clear (the relationships observed in the present sample may have merely reflected the polarization of the two workflow variables over the whole sample), and in indicating an unconfirmed and unspecific relationship in this area the model suggests an area of further research rather than a statement about the reality of the sample studied.

In emphasizing the importance of the local system as a determinant of an individual school's administrative structure the model indicates a direction for future studies of school organizations. Implicit in the model is the notion that a school is an organization in the Aston sense only in some respects, that attempts to apply some of the concepts of organization theory to schools may founder unless they take into account the status of the school as a sub-unit of a parent organization, and that an uncritical measurement of variables validly measured in other organizations may give misleading results in the case of individual schools. A clear example arose in the present study with the variable Functional Specialization. Of key importance in the Aston studies, this variable, when adapted to the school organization proved to be relatively unimportant and the indications were that a continued use of the term Functional Specialization in the school setting was inappropriate. The possibility remains that a measure of Functional Specialization at the school system level (as in the Aston sample) yields a valid score and may well, like the Formalization variable, show important associations with the internal structure of individual schools.

The Internal Structure of the School

The apparent complexity of the network of relationships between the variables of the internal structure of the school can be simplified if the variables are seen as four sets: (1) those related to the Aston concept of Structuring of Activities (Delegation and School Formalization of Role Definition), (2) those related to decision-making (Autonomy, In-school Decision Level and Discretion), (3) those measuring the sizes of various supportive components, (4) those related to the workflow. When the variables are seen in this way it becomes clear that several relationships exist within and between the three sets of administrative structure variables and that only one relationship exists between the variables of administrative and workflow structure.

Within the administrative structure clear relationships exist between the variables of Formalization and decision-making and the various supportive components. The detailed relationships appear less important than the two generalizations which follow from them: first, that Formalization of Role Definition appears to occur when it is most needed (i.e., when there is a greater number of role-takers) and second, that Autonomy appears to be related to the extent to which clerical and other ancillary staff are employed but not to the number of caretakers employed.

The other noticeable feature of the relationships shown in this area of the model is the lack of association between the variables of administrative structure and those of workflow structure. The single linking relationship found in this study (between Acceptance and the Percentage of Caretakers) was possibly incidental, occurring as a result of the strong association between the size of the school and both these other variables.

At this point the model raises two important questions. First, how complete is the description it affords of the reality of a school's internal structure? Second, if it can be accepted that the most practically important aspect of a school's operation is its workflow, and if, as the model suggests, there are few or no relationships between the internal administrative structure and the workflow structure, what is the value of studying the administrative structure? The questions are closely interconnected since, if the model does give a complete description of a school's structure, there would appear to be little value in understanding that part of it which appears to be solely concerned with the management of staff and the locus of administrative decision-making. It seems important, therefore, to examine some of the ways in which the model may be incomplete in order to be able to make some judgement about the value of studies which focus on the organizational structure of schools.

AN EVALUATION OF THE MODEL: ITS THEORETICAL IMPLICATIONS

Of the two questions raised above, the first serves as a good focus for a critical examination of the model, the second for the conclusions which might be drawn from such an examination. Although the questions arose largely as a result of the consideration of the third area of the model--that which describes the school's internal structure--they can usefully be applied to the whole model since the four areas it portrays are only analytically distinct, and in reality closely interrelated.

The data of the present study suggest that there are three main ways in which the model may be incomplete. First, it may be overgeneralized; second, it may be oversimplified; third, the Aston variables may be in some respects inappropriate for the purposes of a comparative analysis of school organizations. The criticism of overgeneralization concerns the area of the model which deals with the environment; the criticism of oversimplification applies to the second and third areas of the model; that of the possible inappropriateness of the variables refers largely to the area of the internal structure of schools and raises further questions about the nature of schools as organizations.

Overgeneralization

Overgeneralization in the first area of the model was inherent in the design of the study. The socio-cultural and economic environment was conceived (Chapter 3) as consisting of a "general set of meanings" whose impact was measured through the way in which schools differed between the two geographic locations from which the sample was taken. In that this approach resembles that of the action theorists (Silverman, 1970) it may be seen as a legitimate approach to an area so complex as to make the isolation of single variables difficult. At the same time, there were indications in the data that a more extensive study could reveal discrete elements in the environment which have a significant impact on other variables in the model.

The two clearest examples concern the economic aspects of the environment and the professional values inculcated in a given culture. The effect of the economic environment was suggested in the present study by the way in which certain expenditures differed in the schools of the two sub-samples, notably in the provision of audio-visual and duplicating equipment.[31] The role of professional values may be indicated by the polarization across the two sub-samples of the variables of Personalization and Acceptance and in the kinds of support staff employed.

Oversimplification

The relocation of the two variables of System Formalization and Centralization in the area of the model which concerns the local system was a direct result of the analysis of the present data. However, these data also suggest the need for the incorporation of a more complete set of local system variables. Such elements as research and planning, staffing policies and professional in-service training are among those which the instruments attempted to examine but which did not emerge strongly at the school level. The indications that such elements are best analyzed within the context of the local system organization not only confirm the importance of this area of the model, but also suggest some of the ways in which its analysis might be expanded.

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[31] See Appendix E. Although not used to form scales of workflow diversification, the data concerning these kinds of equipment differed markedly in Alberta and the West Riding.

The area of the model which deals with the internal structure of the school poses problems in several ways. The lack of association between the administrative and workflow structures has already been noted, but the data and their analysis raise questions about the variables within each of these areas separately. In the analysis of the workflow structure the raising of questions was to be expected since it was in this area particularly that the study broke new ground. The formulation of the two scales of Personalization and Acceptance as measures of different dimensions of workflow structure was the result of a first attempt to classify the workflow of a school in terms of its diversification. Further work in this area, using additional data and extending the parameters in which the area was conceptualized might be expected to lead to an expansion of the number of dimensions which are analytically useful. However, whether such an expansion would lead to the identification of relationships between the workflow and administrative structures is doubtful, unless it could be accompanied by some further expansion within the area of the administrative structure itself.

That the model's representation of the school's internal administrative structure is oversimplified is indicated in several ways. Most of the observed relationships within this area refer only to the sizes of the various supportive components. Further, some of the observed relationships (and the lack of some relationships) do not seem satisfactorily explicable in terms of the variables included in this section of the model. Two examples give some indication of one particular element whose omission may be important and whose incorporation may not only provide a link with the workflow structure, but may also call into question the suitability of the range of variables used in the model.

The model shows no strong, confirmed relationships between either Delegation or Discretion and any other structural variable. As the model stands, both these variables may seem superfluous and yet each may be held to describe some part of the reality of a school: Delegation occurs more or less specifically and more or less intensively and is likely to have an effect on the working life of a school's staff; the amount of Discretion a principal or headmaster has at his disposal may be assumed to have an effect on (among other things) the ease with which changes may be incorporated into a school's operation and hence to affect the working life of the school.

It is possible to see both these variables as being closely linked to some characteristics of the principal or headmaster himself. Thus, variations in the degree of delegation which appear to be unrelated to the size of school or to any other structural variable except, possibly School Formalization, may well prove to be explicable in terms of the principal's preferred leadership style. Similarly, the way in which the principal uses the Discretion he has available may be partly a function of the way he acts as chief executive officer in the school. In this latter case particularly, it is possible to speculate further that a link would be provided with the workflow structure since, in the present sample, Discretion occurred in the schools of two systems in the area of staff appointments, and it seems not unlikely that changes in the workflow dimension of Personalization in a school would be to some extent associated with the kind of staff recruited.

This suggestion--that one of the missing elements in the representation of the internal administrative structure of the school is a variable relating to the personality or leadership style of the principal--is speculative.[32] It is a speculation which may be valuable in itself, but its value also lies in the insight it gives into one way in which the range of structural variables used in the model may be inappropriate in the context of a comparative study of school structure and operation. This possibility is further explored in the following section.

The Appropriateness of the Variables

The incorporation into the model of any variable, such as the one suggested above, which refers to some attribute or behaviour style of one member of the organization would disturb a basic unity among the variables of administrative structure. As in the Aston studies the variables used here are all non-behavioural variables and refer to non-personal aspects of organization. Moreover, they are all "pure" structural variables in the sense that they were deliberately conceived to exclude the workflow processes of an organization, and they all stem from concepts included in the bureaucratic model (Pugh et al., 1963).

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[32] The speculation is strengthened by Punch's (1967) finding that the "system orientation" or "person orientation" of the principal as measured by the LBDQ XII showed a strong positive association with the degree of bureaucratization in the schools of his sample.

Although the Aston researchers concluded that bureaucracy was not a unitary concept and that organizations could be bureaucratized in a number of different ways, their results nevertheless confirm the value of various elements of the bureaucratic model in drawing comparisons between the structures of different kinds of organizations.[33] The bureaucratic model, however, speaks to a rational mode of establishing loci of authority and of structuring roles in terms of their specifically prescribed duties by systems of procedure and documentation. In short, the bureaucratic model is concerned with the dimension of administrative control. The processes of administration, although having as their prime function the facilitation of the workflow, are not themselves workflow processes and the analytical dimension of administrative control may be some way removed from those dimensions of organization which are concerned with the workflow.

This aspect of the separation of the administrative and workflow dimensions was found in the Aston work and forms the basis of a hypothesis formulated by Hickson et al. (1969:394) who write:

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[33] 33. The replication of the Aston work by Child (1972) casts some doubt on the multidimensionality of the bureaucratic model in one respect. His results showed the two main structural dimensions (Concentration of Authority and Structuring of Activities) not to be independent as in the Aston sample, but to be negatively associated, thus confirming the Weberian thesis of a bureaucratic control strategy in which decision-making is decentralized to the incumbents of clearly defined and structured roles. To a limited extent the present study confirmed Child's finding, since Centralization was negatively related to System Formalization of Role Definition. See above, p. 198.

> Associations with operations technology will be found only among variables of structure that are centred on the workflow. Such variables are likely to be job-counts of employees on production-linked activities, and not features of the wider administrative and hierarchical structure.

Although the variable of "operations technology" was not used in the present study, this hypothesis is consistent to some extent with the findings reported here, since the only association between workflow and administrative structure at the school level was that between the Percentage of Caretakers and Acceptance. What is interesting about the hypothesis in the present context, however, is that it was formulated in an attempt to explain the absence of strong associations in the Aston sample between variables of technology and structure. Moreover, in the explanation which follows the hypothesis, organizational size is used as the mediating variable on the grounds that it is in smaller organizations that technology and the administrative structure are most closely connected.

However, it is arguable that the "distance" between the workflow and the elements of administrative control need not necessarily depend only on the size of the organization, but that the status of the organization (sub-unit, branch plant, regional office, head office) may be of crucial importance. An explanation based on organizational status would take into account the probability that the administrative structure would be of greatest importance in those levels of organization which existed to manage the "lower" operating levels, and that the level of organization which was a pure production plant would be structured administratively in accordance with the policies of the head office of the organization.

This explanation postulates a continuum of organizational units based on their proximity to the actual production processes in which the total organization engages. It also carries considerable implications for the comparative study of organizations, since not only is it important to consider which units are being compared, but also whether the terms of the comparison are appropriate to those units. Thus an analysis of the bureaucratic dimensions of administrative control may be wholly appropriate to a comparison between total organizations or head office organizations, but may say very little about the important dimensions in production sub-units or branch plants, since in these units the "received" administrative structures may be simply a background to the local structures developed to control the workflow.

If this argument is applied to the educational context then it becomes clear that measures of the bureaucratic dimensions of administrative structure may not, of themselves, be the most appropriate tools with which to conduct a comparative study of schools. Within the organization of public education the school may be seen as the production unit; its administrative control dimensions are to a large extent "received" from the higher level unit of the local system in which the establishment and maintenance of administrative control is of primary importance.

This relationship between the school and its local system emerged to a considerable extent in the present study and is reproduced in the model which shows the links between the local system variables and those of the school's internal administrative structure. What the study did not examine, and hence what is not shown in the model, is the presence of one or more variables in the internal administrative structure of the school which may be more appropriate to the comparison of school organizations in that they may provide the link between the dimensions of administrative control and the workflow dimensions which describe the school's operation.

The Value of the Model

In view of these considerations, the value of the model as a framework for the comparative study of the structure and operation of schools appears limited. It is to some extent overgeneralized; it is oversimplified; and in the area of a school's internal administrative structure it shows only variables which may not be the most appropriate for an understanding of the important features of that structure.

Nevertheless, as an attempt to formulate a framework for the comparative study of school organizations, the model makes several useful points. First, it confirms the value of what Riggs (1962) called the "ecological" model in that it suggests points of interaction between the wider environment and specific elements of the school and local system. Second, it points to the difficulty of analyzing school structures without also analyzing the structural elements of the local systems to which they belong. Third, it suggests that an analysis of the bureaucratic elements in schools is not sufficient to give an understanding of the way their administrative and workflow structures are linked. And fourth, it points to the feasibility of analyzing elements of the workflow structures in schools in terms of their diversification. The revised model was the result of what was essentially an exploratory study. Its main value lies in that it charts the results of the exploration and suggests possible directions for future research.

As a description of the reality of school operation it stops short at the point where the most interesting operational comparisons might be made, but it goes some way toward facilitating those comparisons.

In this sense the value of the model and the research upon which it was based is for the theorist and the researcher. The study of educational organizations and the development of a theoretical framework for the comparative study of schools must, however, find their ultimate justification in the potential they afford for improved practice in the schools themselves. A great deal of this potential resides in the way in which theory and research can provide a better understanding of the operation of educational organizations for those who work in them, since this understanding should ideally raise further questions in the minds of practitioners. Comparative studies, in that they present for the practitioner in any given environment a perspective which may be very different from his own, might perhaps be regarded as the most potentially catalytic of all education studies. The concluding section of this chapter attempts to suggest ways in which the research described in this report permits a comparison between the Alberta and West Riding secondary schools which raises pertinent questions for the practitioner in either.

THE USE OF THE MODEL: A COMPARISON AND ITS IMPLICATIONS FOR PRACTICE

Similarities and differences in the everyday classroom work of teachers in the Edmonton and West Riding schools cannot be analyzed within the framework of the present model. Similarities and differences relating to the type and size of the schools were outlined earlier (pp.65-69), and the comparison in the following paragraphs is limited to a discussion of the local system and in-school elements of the model and to a consideration of the three systems and twenty-one schools which provided the data for the study.

The Structural Elements Compared

Neither of the two elements of administrative structure whose main impact is at the local system level differs greatly in the Edmonton and West Riding school systems. The extent to which roles are defined by written documents is different in each system, but the differences are not great. The prime locus of educational decision-making in all three systems is above the level of the individual school and although a greater number of the listed decisions can be taken at the school level in the Edmonton Separate system, the autonomy of schools as measured in this study is not significantly different in the two subsamples.

On the evidence of these system level comparisons, the indications are that the secondary schools in the two areas might be expected to be structured in a similar way. In some ways such expectations appear to be confirmed by an examination of the schools themselves: the specificity and intensiveness of delegation and the degree of written formalization of roles may differ in any two schools, but does not differ significantly among the schools of the two areas, and neither does the level within the school at which in-school decisions are made. In other ways, however, the apparent similarity of the elements of administrative structure in the two systems masks differences which are clearly discernible at the level of the school itself. These differences lie in two areas: that of decision-making and that of the proportions of staff engaged in clerical and other supportive activities.

Three important differences may be observed in the Edmonton and West Riding schools in the way in which decision-making operates. First, the number of listed decisions taken at the school level, although different in each of the two Edmonton systems, does not vary within each of those systems whereas it varies from two to five in the West Riding schools. Second, the presence in the West Riding of a board of governors for each school has the effect of bringing some decisions closer to the operating level of the school than is the case in the Edmonton systems. Third, the discretion available to headmasters in the West Riding is greater than that allowed to principals in the two Edmonton systems.

The first two of these differences are closely connected and, taken together, give a sharp focus to differences in the way in which the boundaries of the school organization may be conceived in the two areas. The uniformity of the degree of Autonomy in all the schools of either one of the Edmonton systems is reflected in the West Riding by a uniformity in the number of decisions which may be taken at or below the level of the board of governors. Thus, a given number of decisions is delegated in all three systems to levels below that of the system's central office. In the Edmonton systems these decisions are delegated to the school, in the West Riding they are delegated to the board of governors and it seems likely that the variation in Autonomy found in the West Riding schools is the result of varying degrees of further delegation by each board of governors. Thus it might be inferred that, in respect to the legitimate delegation of authority to make decisions, a difference exists in the two areas as to what are conceived to be the organizational boundaries of the school. In the Edmonton case the school is the organization located in the physical plant in which its activities are performed; in the West Riding case a school is the organization located in the community which it serves.

The Edmonton principal does not have to work with a board of governors in making local decisions but he appears to enjoy less flexibility in terms of the discretion available to him than does the West Riding headmaster. (Discretion in the present context refers to the unofficial decision-making power of the principal or headmaster in the sense that for many practical purposes a decision may be in fact a recommendation which is certain to be ratified.) Whereas six out of the nine West Riding headmasters interviewed had a degree of legitimate autonomy which was no higher (and in some cases lower) than that of any Edmonton principal, the number of decisions which they could recommend with the certainty of their being accepted was similar to that found in the Edmonton Separate schools and greater than that in the Edmonton Public schools.

It is interesting to contrast the kinds of decision in which the element of Discretion operates in the two sub-samples. Table 22 lists the fourteen decisions which make up the refined scale of Centralization (Concentration of Authority) and shows, for each of the three school systems, the level at which each decision may legitimately be made and the level at which it may practically be made by a recommendation which is certain of acceptance. In the Edmonton systems Discretion operates in the area of professional staff appointment or

Table 22

Decision-Making Levels in Three School Systems for Each of Fourteen Decisions[(a)]

Item No.	To decide on:	E.P.S.D.		E.S.S.D.		W.R.C.C.	
		Level of legitimate decision	Level of recommendation certain of acceptance	Level of legitimate decision	Level of recommendation certain of acceptance	Level of legitimate decision	Level of recommendation certain of acceptance
2	Number of department heads	5	5	4	4	5	5
3	Number of teachers	5	5	4	4	5	5
5	Appointment of department head	4	4	4	2	5	3
6	Appointment of teacher	4	4	4	2	5	3
9	Department head's allowance	5	5	5	5	2/3	2/3
12	Type or brand of new equipment	5	5	4	4	4	4
13	Introduction of new course	2	2	2	2	3	2/1
14	Introduction of new program	4	4	4	4	3	2
16	Which employment opportunities presented to students	2/1/0	2/1/0	2/1/0	2/1/0	3	2/0
20	Department head dismissal/ demotion	4	2	2	2	5	5
25	Staff welfare facilities	2/0	2/0	2/0	2/0	2/1/0	2/1/0
29	Alter caretakers' jobs	4	4	4	4	2	2
30	Creation of new department	4	4	2	2	2/3	2
31	Creation of new job	2	2	2	2	2/3	2

(a) The description of decisions is abbreviated. Full descriptions are in Table 12, p. 160.
Decision levels: 5 - School board/LEA, 4 - Superintendent/chief education officer or other central office personnel, 3 - Board of governors, 2 - Principal/headmaster, 1 - Department head, 0 - Teacher.

dismissal (items 5, 6, 20), whereas in the West Riding it operates in the areas of program (items 13, 14, 16) and the internal organization of work (items 30, 31). The area of professional staff appointment and dismissal is interesting in that it includes a marked difference between the two sub-samples in the status of department heads who, in the Edmonton systems are appointed for a one-year term which is not necessarily renewable and who, in the West Riding are appointed on a permanent basis. Perhaps because of this, these appointments are made in the West Riding by higher level office holders than in Edmonton, and the element of Discretion for these decisions extends only to the board of governors and not to the school itself.[34]

Because of the way the instruments in this study were constructed and refined the data do not permit statements about the locus of decision-making in respect of the hiring of support staff. The data describing personnel ratios, however, show a marked difference between the Edmonton and West Riding schools in the proportions of clerical and other ancillary staff employed. The most striking difference is in the clerical component. The number of clerks expressed as a percentage of total staff averaged 10.5 percent in the Edmonton Public schools, 12.7 percent in the Edmonton separate schools and only 3.6 percent in the West Riding schools. The difference between the systems is in the reverse direction when other ancillary staff are considered, the average percentages being E.P.S.D. 4.3 percent, E.S.S.D. 2.2 percent and W.R.C.C. 6.9 percent.[35]

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[34] The difference in the terms of appointment of department heads in the two sub-samples may in part explain the lower levels of West Riding decision-making in the areas of program and work organization in the sense that greater accountability in these areas may be given to permanently appointed senior staff. However, it is also probable that the relatively high level at which Edmonton program decisions are taken reflects the traditional curriculum structure of the province, whereby curriculum guidelines emanate from the provincial government.

Although the study showed no consistent relationships between the relative sizes of these components and the dimensions of workflow structure, there is one way in which a connection may be inferred. A calculation of the pupil-teacher ratio in each school (a figure not used in the study itself, but available from the data shown in Appendices C and E) shows that the ratio was lower in the West Riding schools than in the schools of either of the Edmonton systems.[36] It seems plausible that the relatively high number of teachers and the lower number of clerks in the West Riding schools indicates that teachers in those schools perform some duties which, in the Edmonton schools, are performed by clerical staff. Since teachers are a more expensive commodity than clerical staff it is not logical to see this as an economic device whereby clerical salaries are saved. It seems more likely that the reason for the inclusion of some "clerical" work in the West Riding teachers' work load lies in the concept of teaching implied by the workflow dimension of Personalization which emerged as a sharp discriminator between the Edmonton and West Riding schools. In a school which has a high degree of Personalization, the involvement of staff in different aspects of students' activities seems also to involve them in such activities as the keeping of various records, the collection of moneys and report writing to a greater extent than in a school with a lower degree of Personalization.

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[35] Staff included in "other ancillary staff" are listed above, p. 180.

[36] Mean pupil-teacher ratios at the time of the study were as follows: E.P.S.D. 21.7, E.S.S.D. 19.7, W.R.C.C. 18.4. These figures were obtained by dividing the number of pupils in each school by the number of teachers in full-time equivalents. The number of teachers was the number of staff holding teaching certificates and included administrative and supervisory staff. These latter were counted as full-time teachers, and no account was taken of their administrative or supervisory time allotments.

The comparison of the workflow structures in the two sub-samples is more straightforward than is that of their administrative structures. In the two dimensions of Personalization and Acceptance the difference between the Edmonton and West Riding schools is more marked than in any other area of structure examined in this study. Although Acceptance consistently tends to increase with an increase in school size, the degree of Acceptance in the larger West Riding schools is, with one exception, some way below that in the smaller Edmonton schools. Conversely, no Edmonton school has a degree of Personalization equal to that found in the West Riding schools. Thus, although the West Riding school, considerably more than its Edmonton counterpart, teaches its pupils in a way which takes account of their diverse aspects as people and tends to encourage a strong personal relationship between teachers and taught, it controls their out of classroom time much more rigourously than is the case in the Edmonton schools where an acceptance of students' diversity out of class is present to a much greater degree.

The comparison of the workflow structures of the schools in the two sub-samples is interesting for two reasons. First, it is the only area of comparison in which clear differences emerged immediately. Second, it indicates that an analysis of workflow processes can reveal sharper differences between schools in different locations than can an analysis of the administrative structures of those schools. These observations point to the limitations of the model used as a framework for comparison and indicate a need for its fuller extension into workflow areas. They also raise the question of how an understanding of the similarities and differences between schools can be used in ways which go beyond the satisfaction of mere curiosity. The concluding section of this chapter attempts to show the relevance of some aspects of the comparison to the current Alberta and West Riding scenes.

Implications of the Comparison

The above comparison raises issues of interest to practitioners in both settings. Some discussion of the degree of Acceptance noted in the Edmonton schools is likely to be of interest to West Riding headmasters in the context of the recent raising of the school leaving age (to sixteen) in Britain, and in view of the acceleration in that country of plans for comprehensivisation. For the Alberta principal, newly acquainted with some of the recommendations of the Worth Report (Worth, 1972), both the degree of Personalization in the West Riding schools and the operation of their boards of governors are relevant matters for debate. Each of these things, however, needs to be seen in the context in which it has evolved in order that its appropriateness to a new context might be assessed.

The relatively high degree of Acceptance in the Edmonton schools should be seen against a social background in which the common expectation is that students will stay at school until the end of grade XII (age 18) and in which the possession by young people of some of the trappings of independence (automobiles, some personal income) is more common than it appears to be in Britain. It needs also to be seen against the background of a formalized system of educational certification in which a high school diploma is earned by the accumulation of credits, each of which represents so many hours of classroom instruction. These two features of the Alberta context are among those which may go some way to explaining the high degree of Acceptance in Edmonton schools. The first implies that the school has to cater for young people whose option to leave at the age of sixteen is somewhat constrained but who need to have their independence recognized as much in school as it is outside; the second may imply that education (as measured by the high school diploma) is earned in the classroom and not out of it. Whether Acceptance, as found in the Edmonton schools, is appropriate to a West Riding school, most of whose pupils are below the age of sixteen and whose senior pupils may not constitute the majority of their age cohort, is questionable, although it may be very relevant for those concerned with planning and organizing the sixth form college type of comprehensive school.

If the incorporation into a school of a higher degree of Acceptance implies that teachers need to be prepared to allow students to run their own lives out of the classroom, the adoption of a high degree of Personalization implies that teachers need to be prepared to involve themselves in areas not directly linked to the classroom and in work which they may not otherwise perform. Personalization as measured in this study is not necessarily the same as individualization. Whereas in the North American context individualization is frequently seen as "individualization of instruction," Personalization may go beyond the formal limits of instruction and involve the teacher in guidance, supervisory, reporting and record-keeping functions outside the classroom which, in the current Alberta setting might be performed by non-teaching staff. The kind of Personalization found in West Riding schools may be less appropriate to the Alberta context than the somewhat different concept of Personalization outlined in the Worth Report (Worth, 1972:52).

In the area of school governance, however, the recommendations of the Worth Report (pp.126-7) concerning the establishment of School Councils include changes which would introduce a body similar in some ways to the West Riding board of governors--notably in its being granted "authority and responsibility for specific aspects of school operation" (Worth, 1972:127). Such specific allocation of authority and responsibility is a feature of the framework within which the West Riding boards operate (County Council of the West Riding of Yorkshire, 1953). The authority of the boards of governors, however, is over the internal operation of the school and, in that this includes many aspects of program and curriculum, it raises several questions of restructuring in the Alberta setting. Since traditionally curriculum and program in Alberta have been the responsibility of the provincial government, the introduction of School Councils on the pattern of the West Riding boards of governors would mean an accession of local control in areas where it has hitherto been absent.

The essential feature of each of the elements of school structure discussed above is its location in a given context. While this location may make direct adaptations unfeasible or difficult, discussion of the ways in which they are unfeasible or difficult can make a contribution to the practitioner's understanding of the context in which he works, and in this sense the kind of comparative study attempted here may have a practical as well as theoretical value.

Chapter 10

SUMMARY, CONCLUSIONS AND IMPLICATIONS

SUMMARY

This study was an exploratory study in the area of comparative educational administration whose focus was on the structures of school organizations. It constituted an attempt to develop a conceptual framework and instrumentation for the comparative empirical examination of administrative and workflow structures of secondary schools.

The basic conceptualization was derived from organization theory and postulated a view of schools as "people processing" organizations serving parents and a community and working with raw materials (students) who became the output provided to the markets of employers or institutions of further education. A view of schools as organizations was held to imply that they may possess structural elements in a similar way to any other organization and that these elements would impose limitations or constraints on the processes taking place in the classroom. A preliminary model was designed which indicated three kinds of constraints: environmental, contextual (in the sense in which the word is used in the Aston studies), and structural.

The environmental constraints were regarded not as distinct variables, but as the "general set of meanings" (Silverman, 1970:37) which are inherent in any given socio-cultural and economic environment and which lead organization members to "import certain common definitions of the situation . . . into their organizational behaviour." The geographic location of the school was used as the single variable which represented the environment in which the school operated. Contextual constraints were held to derive from three sources which form part of the context in which school structure is developed: the policies of the local system to which the school belongs, the size of the school and the type of school. Although the technology of an organization was conceived in the Aston studies as an element of context, it was regarded in the present study as belonging to the internal structure of the school and as one of two identifiable areas among those which might impose constraints on classroom processes. These two areas were defined as the internal administrative structure and the technology or workflow structure.

The development of this preliminary model of organizational constraints (Chapter 3) was the first stage of the study. Succeeding stages were concerned with the adaptation and construction of instruments with which to measure structural variables, the use of these instruments in a sample of schools and the analysis of the resultant data to refine the instruments, to assess the external validity of the measures, to revise the preliminary model and to make a comparison between the schools of the two areas represented by the sample.

The short form version (Inkson et al., 1970) of the instruments developed by the Aston group to measure dimensions of an organization's administrative structure was adapted for use in schools and a new instrument was constructed to measure the technology of a school in terms of the extent to which its workflow was diversified (Chapter 5). The Aston instruments were those measuring Functional Specialization, Formalization of Role Definition, and Concentration of Authority.

Their adaptation raised various problems which needed solution before the content of the instruments could be worded in a form appropriate to schools. Although the problems varied with each instrument, they had in common the fact that they posed basic questions of the equivalence of concepts in the settings of commercial or manufacturing and school organizations.

The construction of the instrument to measure the diversification of a school's workflow was based upon a reformulation of Perrow's (1967; 1970) conceptualization in which the technology of an organization is seen as determined by the perceived characteristics of the raw material which it is used to process. Whereas Perrow distinguished between technologies in terms of their routinization, the present study used instead the concept of diversification on the grounds that a view of students (raw material) as diverse individuals, each of whom needed to work at his own pace on his own program, would necessitate a diversification of the educational offering provided by the school, and that a view of students as cohorts of young people, all of whom needed the same fundamental education and all of whom could respond to the same teaching stimuli, would not. Six distinct elements of a school's workflow were conceptualized, each of which was considered in terms of what policies, provisions or practices might vary along a continuum of low to high diversification.

The wording and response categories of these instruments were tested in pilot interviews in four senior high schools and several changes were made. The instruments were then used in interviews with the principals or headmasters of twelve senior high schools in the City of Edmonton and nine all-through comprehensive schools in the West

Riding of Yorkshire in England. The schools also provided size and personnel information.

The data from these schools were used in the refinement of the instruments by tests of internal consistency (Chapter 6). The use of item analysis, a split-half reliability test and (in the case of the Diversification of Workflow instrument) a calculation of Kendall's coefficient of concordance, led to the modification of the instruments so that each included only items which approximated a Guttman scale and which could be considered to form homogeneous sets. This refinement process reduced the number of items in each instrument and led to a change in the measurement of Formalization of Role Definition, which was found to be measurable by two sets of items, one measuring formalization by documents originating at the local system level, the other by documents originating at the school level. The items in the Diversification of Workflow instrument were found to contain two sets of items which appeared to measure different dimensions of diversification. These were labelled respectively Personalization and Acceptance and became the two workflow variables used in the remaining stages of the study.

An analysis of the data pertaining only to the items retained in the refined instruments and to the size and personnel ratios of the schools showed that all instruments discriminated between the schools in the sample. Correlation analyses indicated a degree of external validity for all measures with the possible exception of Functional Specialization which, in its adapted form, appeared to be of less importance in the school organizations studied than in the organizations of the Aston sample. These results also precluded the aggregation of the scores on Functional Specialization and Formalization of Role Definition to create a single score comparable to the Aston "Structuring of Activities" score. (Chapter 7)

An analysis of the way in which the variables discriminated between local systems and geographic locations permitted a distinction between the variables in terms of the loci of their differentiation (Chapter 8). Those variables which distinguished primarily between the two geographic locations were the Overall Size of Supportive Component and two of its constituent parts (Percentage of Clerical Staff and Percentage of Other Ancillary Staff), and the two workflow variables of Personalization and Acceptance. The variables which discriminated primarily between local systems were the Percentage of Caretaking Staff, Formalization of Role Definition at the system level, Concentration of Authority and Autonomy. The variables which differentiated primarily between individual schools were Size, Functional Specialization (renamed Delegation), Formalization of Role Definition at the school level, and the level at which In-School Decisions were made.

The findings of these analyses were used to modify the model of organizational constraints developed in the first part of the study. This modification included a revision of the variables and their location in the model as well as a revision of the relationships portrayed between them (Chapter 9). A critical evaluation of the revised model raised several issues of importance for the study of school organizations. Although the model was to some extent overgeneralized and oversimplified, and although its representation of the internal administrative structure of the school was in terms of variables which may not be the most appropriate for an understanding of school operation, it was useful in four ways. First, it confirmed the value of an ecological model for the comparative study of school organizations; second, it pointed to the difficulty of analyzing school structures in isolation from the structural elements of the local system; third, it suggested that an analysis of the bureaucratic elements in schools was not sufficient to give an understanding of the way their administrative and workflow structures were linked; and fourth, it showed the feasibility of analyzing school workflow structures in terms of their diversification. The use of the model in making a comparison between the Edmonton and West Riding schools showed that, in spite of several structural similarities between them, there were three areas (decision-making practices, employment of support staff and workflow structure) in which the existence of marked differences might raise questions for discussion.

MAJOR CONCLUSIONS AND THEIR IMPLICATIONS

The major conclusions drawn from this study and their implications may be summarized in three areas: theoretical, methodological and practical. These areas are treated separately in the following paragraphs in which the statement of each conclusion is followed by a discussion of its implications.

Theoretical Conclusions and Implications for Further Research

The findings of the study led to five major conclusions which have a bearing on the theoretical aspects of the comparative study of school organizations:

1. An ecological model is of value in studies of school organiations in that it reveals which organizational variables may be affected by the general socio-cultural and economic environment and which variables may be relatively independent of that environment.

The model developed in this study was ecological only in a rudimentary way and relied on the assumption of differences between the "world taken for granted" in each of the different environments rather than seeking to isolate measurable variables in them. However, the assumption received some support from the data of the study, particularly in the way they differentiated between the workflows of schools in Edmonton and the West Riding.

Two implications emerge for further research in this area. First, similar research using schools from other geographic locations would permit testing of the present finding that some school organizational variables are directly affected by the environment of the school and its local system while others seem independent of that environment. In the case of the Western Canadian schools an examination of the workflow variables of Personalization and Acceptance in comparison with both a British and American sample may lead to findings which would shed some light on the influences operating in Western Canadian education. In the Quebec situation a French comparison would be equally interesting.

A second implication follows from a discussion of ways in which the present model may be overgeneralized or oversimplified (c.f. pp. 231-232). There were indications in this study that certain specific points of interaction existed between the environment and the structural elements of educational organizations. A tentative suggestion was made that two such points of interaction were the economic aspects of the environment and the area of professional values. Others might well emerge in a study which focussed more particularly on discrete elements of the socio-cultural and economic environment.

2. An examination of school structures needs to take into account the administrative structures of the local systems to which schools belong.
3. Dimensions of bureaucratic structure exist in schools but are of less importance in an understanding of school operation than in an understanding of the operation of local school systems.
4. Comparisons between organizations of any kind may need to take account of the status of the organization (head office, regional office, branch plant), since an examination of the dimensions of administrative structure may be less revealing the nearer the organizational unit is to the production process.

These three conclusions are closely linked and carry implications both for studies of school structure and for the wider comparison of organizations. The several studies which have examined bureaucracy in schools have focussed on the bureaucratic elements of the individual school organization. This was also the original focus of the present study. What clearly emerged, however, was first, the importance of school system policies of administrative control in determining several aspects of the administrative structure of individual schools and second, the lack of association between the elements of a school's internal administrative structure and the workflow variables. The fourth conclusion noted above stems from these findings and raises questions about the value of a study of production-oriented organizational units in terms of their bureaucratic dimensions.

These conclusions go some way toward reconciling Mayntz's (1964:119) argument that the isolation of universally applicable dimensions of structure would be so general as to be of little value, and the claim of the Aston group (Pugh et al., 1968:91) that their measures provide a useful tool for wide comparative and taxonomic analyses of organizations. Generally applicable measures of the bureaucratic dimensions of administrative control may permit useful comparisons between those organizations or organizational units whose main task is high level coordination, but more idiosyncratic and specific measures may be needed for a comparison of those units which are primarily concerned with workflow or production processes. In the educational context there appears to be a useful focus for further research in the isolation of in-school variables which provide a link between those administrative control structures which are "received" from the local system organization, those which develop in the school itself, and the dimensions of workflow structure.

5. The measurement of dimensions of the workflow in schools is possible at a school level and need not focus exclusively on the classroom level.

The conceptualization of a school's workflow structure in terms of the degree to which it is diversified gave an insight into one way in which the technology of school organizations might be examined at the school rather than the classroom level. The present study revealed two dimensions of a school's workflow structure and the discrimination which they afforded between the schools in the two geographic areas examined indicates that a study of such structures can provide a useful insight into the differences between various approaches to education. Further research could well amplify these dimensions and reveal others. The connection between these dimensions and the day to day work of the classroom teacher should also be explored. Many of the items in the original instrument constructed here were not used in the refined instrument but did, nevertheless, discriminate between the schools in the sample and some of them might serve as points of departure for further investigation.

Methodological Conclusions and Implications

Three conclusions are of interest for the methodology of empirical studies of school structure and operation.

6. The adaptation of instruments developed for use in other organizations is feasible provided that the adaptation is keyed to a consistent conceptual base and is not solely concerned with a linguistic transformation of individual items.

Several problems needed solution in the present study before the individual items of the Aston instruments could be worded in a form suitable for schools. These problems concerned the equivalence of concepts in different kinds of organization as well as methods of scoring. Although the adapted instruments, with the exception of that measuring Functional Specialization, gave results which were similar to those obtained by the original Aston instruments the number of items they contained was reduced and it remains possible that further research could increase the reliability of the instruments used here by adding more items.

The case of Functional Specialization is interesting. The adaptation was made by using the concept of delegation as an equivalent to Functional Specialization and the results of the analysis showed that the variable (Delegation) measured by the adapted instrument was not associated with other structural variables in the same way as was the

Aston variable. This result may be seen as confirming the point of view which led to such a sweeping adaptation of the instrument, namely, that what the Aston studies call Functional Specialization is not something which can be observed in individual schools. The implication which emerges here is that a sweeping adaptation may be less an adaptation than a change, and that interpretation of the results needs to consider this--perhaps, as in the present case, by renaming the variable.

7. Tests of internal consistency are needed for adapted instruments, irrespective of the degree of homogeneity demonstrated for items in the original instrument.

This conclusion emerged strongly from the fact that for all instruments, the first application of item analysis failed to show a reasonable degree of scalability or homogeneity for all items. The recommendation that fresh tests of internal consistency be used is particularly germane to studies which, like the present one, used schools which could be regarded as two sub-samples and in which the composition of a set of scalable items might vary between those sub-samples. Iteration of items was a necessary procedure to ensure a set of items which was scalable across all groupings of schools.

In this connection there appears to be a need for the kind of statistical research which could be oriented toward the development of an algorithm to permit exhaustive iteration of items by computer to avoid the time consuming manual iterations used in the present study. A further area in which statistical research is needed is in the development of a non-parametric alternative to factor analysis where small samples are being considered. Kendall's coefficient of concordance, used here, shows the degree of association between a set of items or variables but cannot show which item or items contribute least to the observed association.

8. Non-personal, non-perceptual data provide a feasible way of examining school structures.

A similar conclusion has already been demonstrated by the Aston studies over a wide range of organizations and by two Alberta studies (Newberry, 1971; Heron, 1972) in colleges. A valuable contribution in this area would be made by a study which tested the feasibility of using a questionnaire method of data collection instead of interviews. The present instruments (Appendix A) formed a standard interview schedule. They may well be suitable for the collection of data by mail and this would permit a considerable increase in sample size.

Although such an increase in sample size would greatly increase the value of the statistical analyses used, the analyses themselves raise a problem which could be the focus of further consideration. The assumption was made in this study--as in the Aston studies (c.f. Levy and Pugh, 1969:197)--that statistical procedures (notably scaling and item analysis) developed in the area of psychological test theory are applicable to organizational data. Few, if any have tested this assumption, nor does its logic appear to have been closely examined.

Conclusions and Implications for the Practitioner

Although the major focus of this study was theoretical and methodological, two observations may be of value to practitioners.

9. In the three systems studied, the degree of decentralization of administrative decision-making to individual schools is not great.

The study showed the clearest link between system and school structures to lie in the area of decision-making. The degree of Autonomy in any school was assessed by counting the number of listed decisions which could be made at the school level and, in spite of differing degrees of Autonomy in the schools of each of the three systems, a majority of decisions in all three systems was taken at a level higher than that of the school. This was true even when decision-making was interpreted broadly as the power to make a recommendation which is certain of acceptance. Decentralization is a concept which appears to be much talked of in the current Alberta scene and although the present study indicates that there is a fairly low limit on the number of administrative decisions which can be decentralized to individual schools, the West Riding comparison shows that the presence of a local intermediate decision-making body (the board of governors) can bring several decisions closer to the level of operation of the school and community. The recommendations of the Worth Report concerning the formation of School Councils might profitably be studied with the West Riding example in mind. Such study would need to consider, however, first the precise areas of decision-making which were to be delegated to such bodies and second, the need for formalization of the specific responsibilities of the School Council.

10. While Edmonton senior high schools, in contrast to West Riding comprehensive schools, appear to be structured to allow a high degree of Acceptance in their workflow, the level of Personalization in West Riding schools is considerably higher than that of any Edmonton school studied.

This conclusion, one of the clearest which emerged in the present study, does not imply that practitioners in the West Riding should necessarily try to emulate their Edmonton counterparts, or vice versa, in respect to the structuring of the workflow. What it does imply is that a higher level of either Personalization or Acceptance than is currently used may be feasible in any given school. In order to ascertain whether an increase in either dimension really is feasible, principals and staffs need to consider the context in which each has developed, and the fact that there may be costs as well as benefits in implementing a workflow structure in which the level of either Personalization or Acceptance is increased beyond the level normally found in neighbouring schools. Thus, to increase Personalization in an Edmonton school may be to incur costs of teacher dissatisfaction with extra duties not normally performed by teachers in the Alberta setting, and to increase Acceptance in a West Riding school may be to tax the tolerance of staffs who are accustomed to comparatively firm controls over students out of class time. Nevertheless, the questions raised by an examination of these two dimensions of workflow structure might well be relevant to West Riding administrators with increased sixth form enrolments and to Alberta administrators newly aware of the recommendations of the Worth Report.

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APPENDICES

APPENDIX A

INTERVIEW SCHEDULE

INTERVIEW SCHEDULE

The format of the following pages is designed to show (a) the interview schedule as it was used for the study, (b) the item numbers assigned to questions for scoring purposes, and (c) an indication of which items were retained in the final selection of items following the application of tests of internal consistency.

The information described under (b) and (c) above is shown in the right hand columns of each page. In the case of the Functional Specialization Instrument the number of the Aston activity from which each item was derived is shown in a circle in the body of the schedule.

SCHOOL STRUCTURE AND OPERATION
INTERVIEW SCHEDULE

NAME OF SCHOOL: ____________________

PARENT AUTHORITY: ____________________

INTERVIEWEE: ____________________ (POSITION) __________

ADDITIONAL SOURCES FOR:

Information on AV equipment ....

Information on duplicating equipment ....

Information on rooms and space allocation ....

Information on sizes of teaching groups ....

Information on time-table ....

Information on personnel numbers ....

Information on extra-curricular activities ....

SECTION A

FUNCTIONAL SPECIALIZATION

I shall mention a number of activities which may or may not be performed in the school. For each activity I would like you to tell me four things:

a) Whether it is performed in the school

b) Whether it has been specifically and exclusively delegated to one person or group

c) Who that person or group is. (This answer may be the name of a person (e.g. Mr. X) or an office (e.g. the head of the English Department), or a group (e.g. Committee Y)

d) Whether the person or group delegated performs that activity full-time. (i.e. performs no other activity in the school)

Activity (Aston activity numbers in circles)	Per-formed	Delegated: Yes/No	Delegated: To whom	Item No. for scoring purposes	Retained in final selection of items*
①					
1. Arranging appeals, fund-raising functions, publicity, etc.	☐	☐	....	1	*
2. Arranging ceremonies for parents or students.	☐	☐	....	2	
3. Administering or acting as school liaison officer for an alumni or former pupils' association.	☐	☐	....	3	
4. Producing a school magazine.	☐	☐	....	4	
5. Producing a school yearbook.	☐	☐	....	5	
6. Producing a school newspaper.	☐	☐	....	6	*

	Per-formed	Delegated: Yes/No	Delegated: To whom	Item No. for scoring purposes	Retained in final selection of items*
②					
7. Coordinating the presentation of careers advice to students.	☐	☐	....	7	*
8. Liaison with employers or institutions of further education.	☐	☐	....	8	
9. Receiving or dealing with parent or community complaints.	☐	☐	....	9	
③					
10. Coordinating school bus requirements.	☐	☐	....	10	
11. Coordinating transportation for field trips or outside visits.	☐	☐	....	11	*
12. Operating an in-school delivery system for internal mail, equipment or supplies.	☐	☐	....	12	
④					
13. Hiring teaching staff.	☐	☐	....	13	
14. Hiring non-teaching staff.	☐	☐	....	14	
15. Allocating staff to broad areas of work (e.g. departments).	☐	☐	....	15	*
⑤					
16. Coordination of in-service training or staff discussion groups other than departmental meetings.	☐	☐	....	16	

	Per-formed	Delegated: Yes/No	To whom	Item No. for scoring purposes	Retained in final selection of items*
⑥					
17. Coordination of staff welfare, social or sports activities.	☐	☐	....	17	
18. Operating canteen or cafeteria facilities.	☐	☐	....	18	*
19. Operating a suggestion scheme.	☐	☐	....	19	
20. Operating the sale of books or stationery.	☐	☐	....	20	
21. Operating medical facilities.	☐	☐	....	21	*
⑦					
22. Buying materials and equipment.	☐	☐	....	22	
23. Stock control.	☐	☐	....	23	*
24. Selection or pre-testing of students.	☐	☐	....	24	
⑧					
25. Operating caretaking services.	☐	☐	....	25	*
26. Maintenance of AV equipment.	☐	☐	....	26	
27. Maintenance of laboratory equipment.	☐	☐	....	27	
28. Maintenance of general school building equipment.	☐	☐	....	28	
⑨					
29. Performing business or accounting functions.	☐	☐	....	29	*

	Per-formed	Delegated: Yes/No	Delegated: To whom	Item No. for scoring purposes	Retained in final selection of items*
⑩					
30. Time-tabling and curriculum coordination.	☐	☐	....	30	
31. Drawing up and/or coordinating overall discipline procedures.	☐	☐	....	31	*
⑪					
32. Coordinating student advancement from grade to grade or from one level to the next senior level.	☐	☐	....	32	*
33. Preparing examination schedules.	☐	☐	....	33	*
34. Making arrangements for seating and space allocation for exams.	☐	☐	....	34	*
⑫					
35. Devising or assessing new ways of time-tabling existing courses or programs.	☐	☐	....	35	*
⑬					
36. Designing ways of incorporating new courses or programs or coordinating suggestions in this area.	☐	☐	....	36	
⑭					
37. Operating record keeping or filing systems for student records.	☐	☐	....	37	*
38. Operating record keeping or filing systems for office or administrative purposes.	☐	☐	....	38	

	Per-formed	Delegated: Yes/No	Delegated: To whom	Item No. for scoring purposes	Retained in final selection of items*
⑮ 39. Handling legal or insurance affairs.	☐	☐	....	39	*
⑯ 40. Researching or assessing the needs of employers, the community, or institutions of further education, and their likely effect on school policy or operation.	☐	☐	....	40	

SECTION B

FORMALIZATION OF ROLE DEFINITION

In this section I would like to ask about some documents which may or may not be used in the school. If possible, I would like to borrow copies of any which may be available.

1. Does the school have any general information booklets (e.g. prospectuses, calendars, etc.)?

   What are they? Do they apply to this school only? Or to all schools in the school system or local authority? To whom are they distributed?

Name of Document	This school only	System wide	Distribution to:	Item No. for scoring purposes	Retained in final selection of items*
....	....	......	....	1. No. of system documents	*
....	....	......	....		
....	....	......	....		
....	....	......	....	2. Distribution of system documents	*
....	....	......	....	8. No. of school documents	*
....	....	......	....		
....	....	......	....	9. Distribution of school documents	*
....	....	......	....		
....	....	......	....		

		Item No. for scoring purposes	Retained in final selection of items*
2. Does the school have an organization chart?			
If so, is it distributed to principal/headmaster only	☐	3. System chart and distribution.	*
to principal/headmaster plus senior assistant principal or deputy head	☐	10. School chart and distribution.	*
to the above plus department heads/coordinators/housemasters	☐		
all staff	☐		
all staff and students	☐		

3. Are written terms of reference, job descriptions or operating instructions provided for any of the staff categories below? If so, are they applicable to this school only or to all schools in the school system or local authority?

	This school only	System wide	Item No. for scoring purposes	Retained in final selection of items*
Principal/headmaster	☐	☐	4. No. of categories for whom system documents exist	*
Assistant principal(s), heads of departments, housemaster or equivalent	☐	☐	11. No. of categories for whom school documents exist	*
Bursar, business manager, registrar or equivalent "staff" positions	☐	☐		
Teaching staff	☐	☐		
Non-teaching staff	☐	☐		
Janitors/caretaking staff	☐	☐		

4. Is there a composite manual of procedures?

For this school only ☐

For all schools in the school system or local authority ☐

5. Are the policies of this school available in written form?

	This school only		System wide
Yes	☐	Yes	☐
No	☐	No	☐

6. The time-table is, I presume, written down. Is there also a written schedule of the sequence of various activities over the year?

	This school only		System wide
Yes	☐	Yes	☐
No	☐	No	☐

Item No. for scoring purposes	Retained in final selection of items*
5. System manual	*
12. School manual	*
6. System policies	*
13. School policies	*
7. System schedule	*
14. School schedule	*

		Item No. for scoring purposes	Retained in final selection of items*
7. Does the school have any of the following?		15-21 School items only	
Written school rules	☐	15	*
Written instructions for standing committees	☐	16	
Written agenda for staff meetings	☐	17	
Written minutes of staff meetings	☐	18	
Regular written reports from standing committees or other groups	☐	19	
A written program for in-school research	☐	20	*
Regular written administrative bulletins	☐	21	*

SECTION C

CONCENTRATION OF AUTHORITY

Item No. for scoring purposes	Retained in final selection of items*

In this part of the interview I am concerned with the levels at which formal decision-making authority rests.

The question "Who decides such and such ...?" often is not easy to answer in clear-cut terms. To try to get an accurate picture of the situation in the school, I am proposing that for any given decision, a person may have one of three different kinds of authority:

1. He may recommend and hope for a favourable decision
2. He may recommend and be certain of a favourable decision (D(RC)).
3. He may decide. That is, as a result of his decision, action may start immediately. Others may have to be informed of the decision, but the decision will not be affected (D).

I shall present a list of decisions. Could you tell me, for each decision, who makes that decision. Please indicate whether the making of the decision is in the category D(RC) or (D) above. In the case of D(RC) answers, it would help if you could indicate who has the authority for D.

Please answer in terms of one of the following categories:

0. TEACHER
1. DEPARTMENT HEAD OR ASSISTANT PRINCIPAL
2. PRINCIPAL (HEADMASTER)
3. BOARD OF GOVERNORS (U.K. SCHOOLS ONLY)
4. SUPERINTENDENT (CHIEF EDUCATION OFFICER) OR CENTRAL OFFICE PERSONNEL DELEGATED BY HIM
5. SCHOOL BOARD (LOCAL EDUCATION AUTHORITY)
6. GOVERNMENT DEPARTMENT

Who decides:

		Item No. for scoring purposes	Retained in final selection of items*
1. The number of assistant principals in the school	....	1	
2. The number of department heads in the school	....	2	*
3. The number of teachers in the school	....	3	*
4. The appointment of an assistant principal	....	4	
5. The appointment of a department head	....	5	*
6. The appointment of a teacher	....	6	*
7. The promotion of staff within the school	....	7	
8. The amount of allowance of assistant principals (deputy heads)	....	8	
9. The amount of allowance of department heads over and above their teacher salary	....	9	*
10. To spend unbudgeted or unallocated money on capital items	....	10	
11. To spend unbudgeted or unallocated money on revenue items	....	11	
12. The type or brand of new equipment	....	12	*
13. The introduction of a new course (subject)	....	13	*
14. The introduction of a new program	....	14	*

Who decides:

		Item No. for scoring purposes	Retained in final selection of items*
15. The boundaries of the attendance area	....	15	
16. Which employment or further education opportunities shall be presented to students	....	16	*
17. What items or processes shall be costed	....	17	
18. What aspects of the school's operation shall be evaluated	....	18	
19. To dismiss or demote an assistant principal (deputy head)	....	19	
20. To dismiss or demote a department head	....	20	*
21. To dismiss a teacher	....	21	
22. The methods of training or help for new staff	....	22	
23. Entrance or selection procedures for new students at the beginning of the school year	....	23	
24. Which feeder schools shall provide new students	....	24	
25. What and how many staff welfare facilities are provided	....	25	*
26. The costs to parents of books, uniform, sundries	....	26	
27. To alter the responsibilities or area of work of teaching staff	....	27	

Who decides:	Item No. for scoring purposes	Retained in final selection of items*
28. And of non-teaching staff (excluding caretakers	28	
29. And of caretakers	29	*
30. To create a new department	30	*
31. To create a new job	31	*

SECTION D

DIVERSIFICATION OF WORKFLOW

		Item No. for scoring purposes	Retained in final selection of items*
This last group of questions concerns the way the school operates its workflow--what is taught and how the education of students is equipped, arranged and evaluated.			
1. Concerning the initial placement of a student in a program area, which of the following best describes the school's policy?			
1. Free student choice	☐		
2. School direction based on some indication of ability and student choice	☐	11	
3. School direction based on some measure of ability	☐		
2. Where there is more than one teaching group for a given subject, how are students assigned to groups?			
1. By random allocation	☐		
2. By a mixture of random allocation and student choice	☐		
3. By student choice moderated by time-table constraints	☐	12	
4. By student ability moderated by time-table constraints	☐		
5. By student ability	☐		

	Item No. for scoring purposes	Retained in final selection of items*
3. What is the policy governing the time at which students arrive each day?		
1. All students start school at the same time ☐		
2. Some students start at a regular time, others need not arrive until the time of their first class ☐	14	*
3. No student needs to arrive until the time of his first class ☐		
4. How frequently does it happen that a student has to revise his selection of courses (subjects) because what he originally wanted to do is not possible under the existing time-table?		
1. Frequently ☐		
2. Quite often ☐		
3. Not very often ☐	17	*
4. Very seldom ☐		
5. Never ☐		

		Item No. for scoring purposes	Retained in final selection of items*
5. When may a student change a course (subject)?			
0. Never	☐		
1. Only at the year end	☐	18	
2. Only at the end of a semester or term	☐		
3. At any time. Provided that there is sufficient time to start the new course	☐		
6. When may a student drop a course (subject)?			
0. Never	☐		
1. Only at the year end	☐	19	
2. Only at the end of a semester or term	☐		
3. At any time	☐		
7. How often do cases of program change on the part of students occur?			
1. Never	☐		
2. Rarely	☐		
3. Infrequently	☐	20	*
4. Sometimes	☐		
5. Frequently	☐		

		Item No. for scoring purposes	Retained in final selection of items*
8. How often do cases of course (subject) change on the part of students occur?			
1. Never	☐		
2. Rarely	☐		
3. Infrequently	☐	21	*
4. Sometimes	☐		
5. Frequently	☐		
9. How often are there cases of students' dropping a course (subject)?			
1. Never	☐		
2. Rarely	☐		
3. Infrequently	☐	22	
4. Sometimes	☐		
5. Frequently	☐		

	Item No. for scoring purposes	Retained in final selection of items*
10. How is student attendance recorded? 1. Daily and formally in home rooms and subject classes ☐ 2. In every subject class throughout the day ☐ 3. Daily and formally in home rooms only ☐ 4. Not at all. Informal cognizance is taken of absence. ☐	23	*
11. What are the policies regarding student absence for students above the statutory leaving age? 1. A note explaining absence is required ☐ 2. No explanatory note is required but when legitimate absence is explained by note an appropriate symbol is used in class attendance record ☐ 3. No note is required; absence is simply recorded ☐	24	*
12. How is excessive or inexcusable absence dealt with for students above the statutory leaving age? 1. A standard system operates which sets out limits and consequences ☐ 2. A set of procedures is used but each case is dealt with on its merits ☐ 3. There is no standard set of procedures and each case is dealt with by an appropriate person in an appropriate way ☐	25	*

		Item No. for scoring purposes	Retained in final selection of items*
13. What is the school's policy about the movement of personnel?			
1. Staff move to students	☐		
2. Students move to staff	☐		
3. Students move to areas and staff move to students within areas	☐	26	
4. There are different policies at different levels of the school	☐		
14. What is the policy regarding spare periods for students?			
0. Students are not scheduled to have spare periods	☐		
1. Spare periods are time-tabled only in certain grades or forms	☐		
2. Spare periods are avoided as far as possible	☐	27	*
3. Spare periods are avoided as far as possible in certain grades or forms, but there is no restriction in others	☐		
4. There is no restriction on the time-tabling of spare periods	☐		

		Item No. for scoring purposes	Retained in final selection of items*
15. Is the attendance of students at spare periods recorded?			
0. There are no spare periods	☐		
1. Yes, for all students	☐		
2. For some students	☐	28	*
3. No	☐		
16. Are spare periods supervised?			
0. There are no spare periods	☐		
1. Yes, for all students	☐		
2. For some students	☐	29	*
3. No	☐		
17. Where do students go during spare periods?			
0. There are no spare periods	☐		
1. All students must be in specified study areas	☐		
2. Some must be in specified study areas, others may be anywhere in the school or its grounds	☐	30	*
3. All may be anywhere in the school or its grounds	☐		
4. All may go anywhere they please	☐		

	Item No. for scoring purposes	Retained in final selection of items*
18. Is there a centrally operated detention system? 0. Yes ☐ 1. No ☐	31	*
19. How is homework assigned for pupils above the statutory leaving age? 1. There is a centrally drawn up homework time-table for all students ☐ 2. There is a centrally drawn up homework time-table for some students ☐ 3. There is no time-table but guidelines are centrally drawn up ☐ 4. Homework is assigned as deemed necessary by the teacher ☐	32	*
20. What programs are offered by the school? (e.g. Matriculation, General Diploma, Business, etc.)	33	

		Item No. for scoring purposes	Retained in final selection of items*
21. Are any subjects required for students above the statutory leaving age, other than what are specified by government or external examining bodies?			
1. More than two subjects	☐		
2. Two subjects	☐		
3. One subject	☐	34	*
4. No required subjects	☐		
22. Training in non-academic responsibility for students often takes place in schools. Does it occur in any of the following ways in this school?			
1. There is a students' union or similar body which has elected officers and which is concerned with student welfare and social activities	☐	35	
2. Students are elected as club or society officers	☐	36	
3. Students are appointed as club or society officers	☐	37	*
4. Students are represented on school policy making bodies	☐	38	
5. Appointed students form part of the school's authority structure	☐		

		Item No. for scoring purposes	Retained in final selection of items*
23. Is there a regular assigned time for any of the following activities during school time?			
Home room/form room business	☐		
"House" business	☐		
Religious ceremonies	☐		
Assemblies	☐	39	
Free choice activities	☐		
Students' Union business	☐		
Extra-curricular activities	☐		
24. Does the school operate a house system or its equivalent? If so, for which of the following purposes?			
C. No house system is used	☐		
1. A house system is used for games only	☐		
2. A house system is used for games and other competitions	☐	40	
3. A house system is used for both the above purposes and for administrative purposes on special occasions	☐		
4. A house system is used for all the above purposes and for the discharge of pastoral responsibilities throughout the year	☐		

		Item No. for scoring purposes	Retained in final selection of items*
25. Is there a home room teacher or equivalent (form master/mistress, tutor, faculty advisor) for each student? If so, which of the following best describes that person's function?			
0. There is no such position	☐		
1. The home room teacher exists as an administrative convenience (e.g. in communication)	☐		
2. The home room teacher functions as above and also carries responsibility for assistance with student program planning and, possibly, pastoral care	☐	41	*
3. The home room teacher has all the above responsibilities and a heavy responsibility for pastoral care	☐		
26. If a problem (other than a behaviour problem) concerning a student came to your attention, which staff member would you first want to consult?			
0. An administrator	☐		
1. Guidance personnel	☐		
2. Grade coordinator or equivalent	☐	42	
3. Subject teacher(s)	☐		
4. Grade coordinator and home room teacher	☐		
5. Home room teacher	☐		

	Item No. for scoring purposes	Retained in final selection of items*
27. Is it school policy to attempt to give at least one spare period to every student above the statutory leaving age?		
0. No ☐ 1. Yes ☐	43	*
28. How is the day to day evaluation of students carried out?		
1. Teachers must comply with school specified procedures ☐	44	
2. By any method the teacher likes ☐		
29. Which of the following best describes the frequency with which teachers are required to submit student marks to a central authority in the school?		
1. Marks required six or more times a year ☐		
2. Marks required four or five times a year ☐		
3. Marks required two or three times a year ☐	45	
4. Marks required at year end only ☐		
5. Marks required only at special request of an in-school administrator ☐		
30. In what form are final marks rendered?		
1. In one standard form ☐		
2. There are several permissible forms ☐	46	*
3. In any form the teacher likes ☐		

	Item No. for scoring purposes	Retained in final selection of items*
31. Which of the following best describes the school's policy on the advancement of students from grade to grade or from form to form or from one course to the next senior course?		
Advancement is dependent on the successful completion of work in the preceding stage:		
1. Always ☐		
2. Almost always, but there are rare exceptions ☐		
3. Usually, but there are some exceptions ☐	47	*
4. Usually, but there are frequent exceptions ☐		
5. Never. Advancement is normally automatic at the year end ☐		
32. Is the document on which pupil progress is reported to parents a handwritten document or a computer prepared one?		
1. Prepared by computer ☐	48	*
2. Prepared by hand ☐		

	Item No. for scoring purposes	Retained in final selection of items*
33. Which of the following best describes the content of the report form?		
1. The report shows marks or grades only ☐		
2. The report shows marks or grades and selected comments from a set list ☐		
3. The report shows marks or grades, comments from a set list, and teacher written comments if desired ☐	49	*
4. The report shows marks or grades and teacher written comments ☐		
5. The report consists largely of teacher written comments with marks or grades added for information ☐		
6. The report shows no marks or grades and consists solely of teacher written comments ☐		
34. Which of the following best describes the scope of the report form?		
1. The report shows achievement only in the subjects studied ☐		
2. The report includes a general summary ☐	50	*
3. The report includes a general summary and may also carry comments on extra-curricular work ☐		

	Item No. for scoring purposes	Retained in final selection of items*
35. Which of the following best describes the way in which report cards are signed?		
1. The report is signed by no staff ☐		
2. The report is signed by subject teachers or home room staff only ☐		
3. The report is signed by both the above ☐	51	
4. The report is signed by both the above and by a senior staff member or by the principal/ headmaster ☐		
5. The report is signed by all the above ☐		
36. AUDIO VISUAL EQUIPMENT INVENTORY		
List all school items of AV equipment which are portable and available for use in a general purpose classroom.	3,4 5,6 7,8 9	
No. of pieces .... No. of kinds		
37. DUPLICATING EQUIPMENT INVENTORY		
List all pieces of duplicating equipment available for teacher use. Include those available either for direct use by teacher or for use by secretarial personnel at teacher's instructions.	10 10A	
No. of pieces .... No. of kinds		

38. TEACHING SPACE INVENTORY

		Item No. for scoring purposes	Retained in final selection of items*
Number of teaching areas overall:	_____		
Number of gymnasia:	_____		
Number of auditoria which are not also gymnasia:	_____		
Number of swimming pools:	_____		
Number of libraries: a) which include work space and in which teaching can take place	_____	1	
b) which do not have enough work space for class teaching to be carried out	_____		
Areas not designated as rooms, but in which, nevertheless, teaching takes place (exclude outdoor areas where teaching may occasionally take place in fine weather)	_____		

Rooms containing fixed, specialist equipment:**

Subject area	No. specially equipped rooms	Subject area	No. specially equipped rooms	Item No. for scoring purposes	Retained in final selection of items*
Art	_______	Languages	_______		
Music	_______	Mathematics	_______	2	
Drama	_______	Science	_______		
Applied arts (Printing, TV etc.).	_______	Physical Education	_______		
Business subjects	_______	Social subjects (Geography, Law, History, Social studies, Sociology Psychology, Economics, etc.). . .	_______		
Domestic subjects	_______				
Industrial & Agricultural subjects	_______	Any others	_______		

** NB Count only rooms which because of their equipment, are not really suitable for general purpose teaching of any subject. e.g., a room set up with many wall maps and used for Geography, but with regular desks or tables as furniture, would not be counted as having fixed, specialist equipment.

	Item No. for scoring purposes	Retained in final selection of items*
39. INVENTORY OF TEACHING GROUP SIZES List sizes of all teaching groups for all periods over the week. Score is standard deviation in group sizes.	13	
40. TIME-TABLE INFORMATION Scheduling period: 5 days ☐ 7 days ☐	15	
Length(s) of teaching periods:		
Variation:	16	

Subject or Block	Total No. occurrences	No. of occurrences which start at a different time of day from the first occurrence
....	....	....
....	....	....
....	....	....
....	....	....
....	....	....
....	....	....
....	....	....
....	....	....

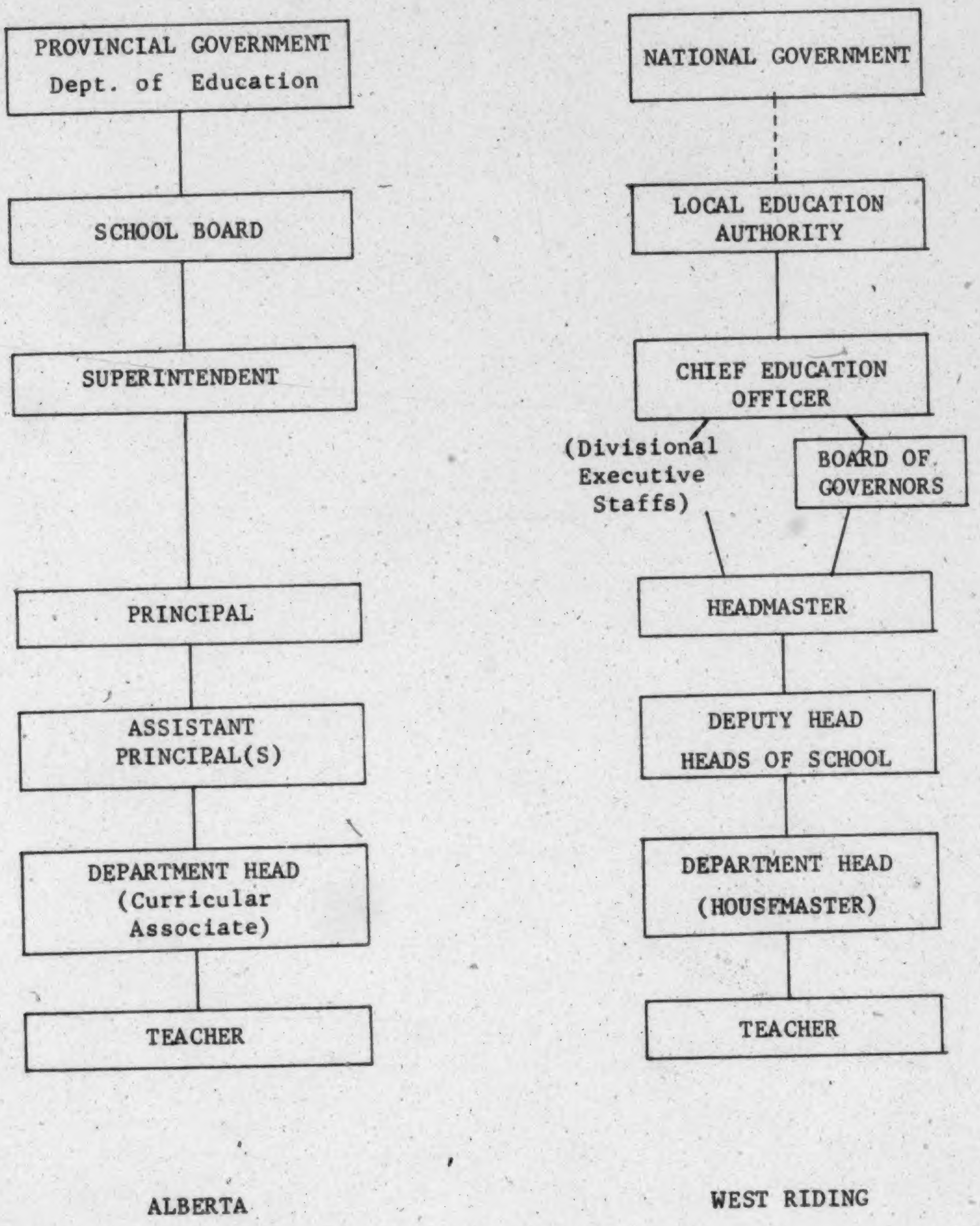
SECTION E

PERSONNEL INFORMATION

	Item No. for scoring purposes	Retained in final selection of items*
Pupil enrolment: . . . . ______		
Number of teachers (includes administration, guidance, teacher-librarians):		
Full time: . . . . ______	1	
Part time: . . . . ______		
Number of clerical employees (includes Bursar, Registrar, Business Manager):	5	
Full time: . . . . ______	10a	
Part time: . . . . ______		
Number of caretaking staff:	and personnel ratios	
Full time: . . . . ______		
Part time: . . . . ______		
Other employees:		
Full time: . . . . ______		
Part time: . . . . ______		
Total employees (Full time equivalents) . . . . ______		

APPENDIX B

OUTLINE OF HIERARCHICAL LEVELS IN THE ALBERTA AND WEST RIDING SCHOOL SYSTEMS


PROVINCIAL GOVERNMENT
Dept. of Education
SCHOOL BOARD
SUPERINTENDENT
PRINCIPAL
ASSISTANT PRINCIPAL(S)
DEPARTMENT HEAD (Curricular Associate)
TEACHER
ALBERTA
NATIONAL GOVERNMENT
LOCAL EDUCATION AUTHORITY
CHIEF EDUCATION OFFICER
(Divisional Executive Staffs)
BOARD OF GOVERNORS
HEADMASTER
DEPUTY HEAD
HEADS OF SCHOOL
DEPARTMENT HEAD
(HOUSEMASTER)
TEACHER
WEST RIDING

Appendix B

Outline of Hierarchical levels in the Alberta and West Riding School Systems

APPENDIX C

SCORES OBTAINED BY TWENTY-ONE SCHOOLS ON VARIABLES OF SIZE, STRUCTURE AND TECHNOLOGY

APPENDIX C

SCORES OBTAINED BY TWENTY-ONE SCHOOLS ON VARIABLES OF SIZE, STRUCTURE AND TECHNOLOGY

The two tables following show raw and standardized scores (mean = 50: SD = 15) obtained by all schools in the sample on each of the variables measured by the adapted (or constructed) and refined instruments or by the computation of personnel ratios.

Schools are identified by a serial number. Schools 1 to 6 are E.P.S.D. schools, schools 7 to 12 are E.S.S.D. schools, and schools 13 to 21 are W.R.C.C. schools. Variables are identified by the numbers shown in the following list.

1. Size: No. of pupils
2. Overall Size of Supportive Component
3. Percentage of Clerical Staff
4. Percentage of Caretaking Staff
5. Percentage of Other Ancillary Staff
6. Functional Specialization (b^2 + ai)
7. Functional Specialization (b.a.i)
8. Formalization of Role Definition (system)
9. Formalization of Role Definition (school)
10. Concentration of Authority (total score) (D)
11. Autonomy (principal and below) (D)
12. Autonomy (governors and below) (D)
13. In-school Decision Level

10a Concentration of Authority (D(RC))
11a Autonomy (principal and below) (D(RC))
12a Autonomy (governors and below) (D(RC))
13a In-school Decision Level (D(RC))
14. Personalization
15. Acceptance

VARIABLES OF SIZE, STRUCTURE AND TECHNOLOGY: RAW SCORES

School	Variable identification numbers																	
1D	1	2	3	4	5	6	7	8	9	10	11	12	13	10a	11a	12a	13a	14	15
1	1786	31.7	12.9	17.1	1.7	56.3	3072	8	11	52	4	4	2.00	50	5	5	2.00	18	37
2	1109	26.0	10.3	13.7	2.0	54.8	2431	8	9	49	4	4	1.25	46	5	5	1.20	17	34
3	2507	30.2	8.4	16.2	5.6	31.8	1078	8	14	50	4	4	1.50	48	5	5	1.60	20	36
4	1536	32.1	9.8	16.1	6.2	67.8	4046	8	16	49	4	4	1.25	47	5	5	1.40	21	37
5	1679	20.5	7.6	11.3	1.6	64.7	2057	8	5	51	4	4	1.75	49	5	5	1.80	21	36
6	1774	31.3	13.7	14.5	3.1	23.8	525	8	16	49	4	4	1.25	47	5	5	1.40	14	31
7	633	27.5	13.2	11.0	3.3	34.2	1496	11	2	41	6	6	1.33	37	8	8	1.50	19	33
8	733	27.6	12.2	13.3	2.1	48.1	2080	11	9	41	6	6	1.33	37	8	8	1.50	22	30
9	955	27.3	12.1	12.1	3.1	27.2	1260	11	6	45	6	6	2.00	41	8	8	2.00	22	32
10	1500	26.5	12.8	12.8	1.0	26.9	1904	11	10	43	6	6	1.66	39	8	8	1.75	23	33
11	769	23.5	11.8	9.8	1.9	29.7	1155	11	2	43	6	6	1.66	39	8	8	1.75	22	25
12	2100	29.1	14.1	13.1	1.9	37.5	576	11	7	44	6	6	1.83	40	8	8	1.88	21	32
13	1637	23.0	5.0	11.7	6.3	76.9	3570	9	13	46	5	8	1.60	39	8	10	1.75	35	25
14	1658	22.6	3.5	12.6	6.5	50.8	2618	9	16	46	5	8	1.60	37	8	10	1.50	36	24
15	1660	22.0	4.0	12.7	5.3	72.1	3808	9	5	47	4	8	1.50	36	8	10	1.38	36	26
16	1800	20.6	3.0	11.3	6.3	41.6	1232	9	3	48	3	8	1.33	37	8	10	1.50	36	19
17	1800	20.0	3.6	11.6	4.8	44.6	2240	9	12	46	5	8	1.60	39	8	10	1.75	34	21
18	1480	23.4	3.9	8.8	10.7	62.1	2145	9	13	47	4	8	1.50	40	7	10	1.71	35	16
19	1297	22.7	3.3	11.6	7.8	30.8	1664	9	14	49	2	8	1.00	37	8	10	1.50	36	13
20	1215	21.9	2.4	12.2	7.3	51.3	1950	9	10	49	3	8	1.66	38	8	10	1.63	32	19
21	1035	19.2	3.6	8.5	7.1	39.7	1836	9	2	51	2	8	2.00	40	7	10	1.71	35	19

VARIABLES OF SIZE, STRUCTURE AND TECHNOLOGY: STANDARDIZED SCORES

School ID	Variable identification numbers																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	10a	11a	12a	13a	14	15
1	60	74	66	81	63	59	66	34	55	74	45	30	75	79	27	29	77	34	69
2	39	53	57	58	34	58	56	34	49	60	45	30	33	66	27	29	19	32	63
3	83	68	51	75	55	36	35	34	65	64	45	30	47	72	27	29	48	38	67
4	52	75	56	74	58	70	81	34	71	60	45	30	33	69	27	29	34	40	69
5	57	33	48	42	32	67	50	34	37	69	45	30	61	76	27	29	62	40	67
6	60	72	69	64	40	29	27	34	71	60	45	30	33	69	27	29	34	26	57
7	24	58	67	40	41	39	42	72	27	22	68	47	38	37	61	50	41	36	61
8	27	59	64	56	34	52	51	72	49	22	68	47	38	37	61	50	41	42	55
9	34	58	64	47	40	32	38	72	40	41	68	47	75	50	61	50	77	42	55
10	51	55	66	52	28	32	48	72	52	32	68	47	56	43	61	50	59	43	61
11	28	44	63	32	33	34	36	72	27	32	68	47	56	43	61	50	59	42	45
12	70	64	70	54	33	42	28	72	43	36	68	47	65	46	61	50	68	40	59
13	56	42	39	45	59	79	74	46	61	46	57	65	53	43	61	64	59	66	45
14	56	41	34	51	60	54	59	46	71	46	57	65	53	37	61	64	41	68	43
15	56	38	36	52	53	74	77	46	37	50	45	65	47	33	61	64	32	68	47
16	61	33	32	42	59	46	38	46	31	55	33	65	38	37	61	64	41	68	33
17	61	31	34	44	50	48	53	46	58	46	57	65	53	43	61	64	59	64	37
18	51	44	35	25	84	65	52	46	61	50	45	65	47	46	49	64	56	66	27
19	45	41	33	44	67	35	44	46	65	60	22	65	20	37	61	64	41	68	21
20	42	38	30	48	64	55	49	46	52	60	33	65	56	40	61	64	50	61	33
21	36	28	34	23	63	44	47	46	27	69	22	65	75	46	49	64	56	66	33

APPENDIX D

SPEARMAN RANK CORRELATION COEFFICIENTS (rho) FOR CORRELATIONS BETWEEN VARIABLES OF SIZE AND ADMINISTRATIVE AND WORKFLOW STRUCTURES

APPENDIX D

SPEARMAN RANK CORRELATION COEFFICIENTS (rho) FOR CORRELATIONS BETWEEN VARIABLES OF SIZE AND ADMINISTRATIVE AND WORKFLOW STRUCTURES

The following five tables show the intercorrelation matrices for nineteen variables in each of the following groupings of schools:

a. Whole sample
b. Alberta schools
c. West Riding schools
d. Edmonton Public schools
e. Edmonton separate schools

Within the tables the variables are identified by the numbers shown in the list below. Where no correlation is shown the schools of that group all obtained the same score on one or both of the pair of variables concerned and hence no correlation was calculated. Levels of significance are stated at the foot of each table.

Variable identification numbers are as follows:

1. Size: No. of pupils
2. Overall Size of Supportive Component
3. Percentage of Clerical Staff
4. Percentage of Caretaking Staff
5. Percentage of Other Ancillary Staff
6. Functional Specialization ($b^2 \div ai$)
7. Functional Specialization (b.a.i)
8. Formalization of Role Definition (system)
9. Formalization of Role Definition (school)
10. Concentration of Authority (total score) (D)
11. Autonomy (principal and below) (D)
12. Autonomy (governors and below) (D)
13. In-school Decision Level

10a Concentration of Authority (D(RC))
11a Autonomy (principal and below) (D(RC))
12a Autonomy (governors and below) (D(RC))
13a In-school Decision Level (D(RC))

14. Personalization
15. Acceptance

WHOLE SAMPLE

Intercorrelations Between Variables of Size and Structure (Spearman rho)

Variable identification numbers	1	2	3	4	5	6	7	8	9	10	11	12	13	10a	11a	12a	13a	14	15
1																			
2	.03																		
3	-.06	.78																	
4	.38	.71	.44																
5	.04	-.23	-.64	-.17															
6	.13	-.21	-.33	.05	.32														
7	-.04	-.14	-.27	.16	.29	.84													
8	-.48	-.07	.19	-.40	-.28	-.41	-.30												
9	.37	.34	-.10	.52	.35	.10	.26	-.48											
10	.38	-.11	-.32	.20	.43	.28	.14	-.87	.24										
11	-.21	.37	.64	.08	-.65	-.25	-.10	.65	-.16	-.84									
12	-.10	-.71	-.71	-.60	.54	.14	.16	.40	-.10	-.24	-.20								
13	.06	-.20	.10	-.18	-.11	-.03	-.06	.26	-.38	.03	.23	.06							
10a	.30	.42	.39	.37	-.17	.02	-.07	-.59	.22	.57	-.10	-.74	.27						
11a	-.26	-.34	-.20	-.38	-.03	-.20	-.10	.83	-.29	-.75	.41	.69	.11	-.84					
12a	-.10	-.71	-.71	-.60	.54	.14	.16	.40	-.10	-.24	-.20	1.00	.06	-.74	.69				
13a	.13	-.05	.19	-.21	-.14	-.12	-.17	.29	-.21	-.08	.34	-.01	.85	.35	.13	-.01			
14	-.02	-.70	-.77	-.52	.49	.19	.24	.29	-.03	-.14	-.25	.91	.02	-.69	.60	.91	-.05		
15	.19	.67	.70	.66	-.54	.07	.09	-.33	.05	.14	.31	-.90	.05	.61	-.55	-.90	.06	-.80	

Note: rho ± .37 significant at p=.05; rho ± .29 significant at p=.10

ALBERTA SCHOOLS

Intercorrelations Between Variables of Size and Structure(Spearman rho)

	Variable identification numbers																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	10a	11a	12a	13a	14	15
1																			
2	.46																		
3	-.01	.32																	
4	.64	.78	-.02																
5	.17	.78	.02	.63															
6	.10	.13	-.41	.27	.24														
7	-.24	.06	-.38	.26	.24	.76													
8	-.58	-.34	.44	-.68	-.41	-.44	-.29												
9	.57	.75	.00	.89	.46	.03	.14	-.61											
10	.74	.26	-.40	.60	.34	.39	.20	-.88	.46										
11	-.58	-.34	.44	-.68	-.41	-.44	-.29	1.00	-.61	-.88									
12	-.58	-.34	.44	-.68	-.41	-.44	-.29	1.00	-.61	-.88	1.00								
13	.22	-.19	.12	-.22	-.15	-.05	-.12	.32	-.39	.17	.32	.32							
10a	.75	.31	-.38	.61	.37	.37	.17	-.87	.49	.99	-.87	-.87	.16						
11a	-.58	-.34	.44	-.68	-.41	-.44	-.29	1.00	-.61	-.88	1.00	1.00	.32	-.87					
12a	-.58	-.34	.44	-.68	-.41	-.44	-.29	1.00	-.61	-.88	1.00	1.00	.32	-.87	1.00				
13a	.24	-.13	.14	-.20	-.12	-.06	-.14	.32	-.35	.16	.32	.32	.99	.17	.32	.32			
14	-.35	-.38	-.16	-.50	-.50	-.18	.03	.69	-.34	-.51	.69	.69	.38	-.49	.69	.69	.40		
15	.51	.38	-.35	.59	.43	.65	.56	-.73	.46	.70	-.73	-.73	-.07	.69	-.73	-.73	-.07	-.42	

Variable identification numbers

Note: rho ± .51 significant at p=.05; rho ± .40 significant at p=.10

WEST RIDING SCHOOLS
Intercorrelations Between Variables of Size and Structure (Spearman rho)

Variable identification numbers	Variable identification numbers																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	10a	11a	12a	13a	14	15
1																			
2	-.09																		
3	.14	.36																	
4	.27	.21	.06																
5	-.76	.44	-.30	-.37															
6	.18	.50	.62	.51	-.22														
7	.28	.32	.73	.67	-.46	.80													
8																			
9	.02	.73	.07	.33	.29	.13	.28												
10	-.67	-.35	-.50	-.43	.53	-.56	-.72		-.52										
11	.59	.28	.50	.46	-.53	.64	.77		.44	-.98									
12																			
13	-.42	-.44	.05	.00	-.08	.15	.22		-.27	.05	.13								
10a	-.43	-.03	.27	-.70	.31	.02	-.12		-.11	.08	.01		.52						
11a	.52	.00	-.26	.73	-.52	.10	.21		.26	-.37	.32		-.26	-.74					
12a																			
13a	-.14	-.03	.34	-.44	-.05	.15	.09		.03	-.26	.33		.50	.86	-.32				
14	.32	.22	.01	.19	-.06	-.20	-.04		.18	-.03	-.12		-.67	-.69	.22		-.76		
15	.48	-.09	.53	.67	-.78	.63	.83		-.07	-.63	.68		.29	-.31	.42		-.04	.08	

Note: rho ± .60 significant at p=.05; rho ± .48 significant at p=.10

EDMONTON PUBLIC SCHOOLS
Intercorrelations Between Variables of Size and Structure (Spearman rho)

	Variable identification numbers																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	10a	11a	12a	13a	14	15
1																			
2	.14																		
3	.03	.49																	
4	.66	.71	.31																
5	.43	.89	.37	.94															
6	-.43	.20	-.49	-.09	.14														
7	-.43	.49	-.09	.26	.49	.83													
8																			
9	.20	.78	.46	.46	.55	-.23	-.06												
10	.58	-.15	-.27	.33	.21	.21	.09		-.52										
11																			
12																			
13	.58	-.15	-.27	.33	.21	.21	.09		-.52	1.00									
10a	.67	.03	-.23	.41	.32	.23	.06		-.29	.96			.96						
11a																			
12a																			
13a	.67	.03	-.23	.41	.32	.23	.06		-.29	.96			.96	1.00					
14	-.06	.00	-.84	-.06	.03	.81	.46		-.19	.31			.31	.37			.37		
15	.15	.53	-.29	.56	.68	.77	.79		.01	.50			.50	.55			.55	.69	

Note: rho ± .83 significant at p=.05; rho ± .61 significant at p=.10

EDMONTON SEPARATE SCHOOLS

Intercorrelations Between Variables of Size and Structure (Spearman rho)

Variable identification numbers	1	2	3	4	5	6	7	8	9	10	11	12	13	10a	11a	12a	13a	14	15
1																			
2	.09																		
3	.26	.71																	
4	.31	.71	.43																
5	-.70	.29	.00	-.20															
6	-.31	.77	.31	.49	.32														
7	-.49	-.03	-.09	.37	.12	.03													
8																			
9	.49	.23	.26	.81	-.57	-.06	.49												
10	.77	-.09	-.12	-.06	-.22	-.44	-.65		.03										
11																			
12																			
13	.77	-.09	-.12	-.06	-.22	-.44	-.65		.03	1.00									
10a	.77	-.09	-.12	-.06	-.22	-.44	-.65		.03	1.00			1.00						
11a																			
12a																			
13a	.77	-.09	-.12	-.06	-.22	-.44	-.65		.03	1.00			1.00	1.00					
14	.33	-.58	-.52	.15	-.65	-.58	.40		.62	.19			.19	.19			.19		
15	.09	.27	.79	.18	.00	-.18	.27		.31	-.23			-.23	-.23			-.23	-.19	

Note: rho ± .83 significant at p=.05; rho ± .61 significant at p=.10

APPENDIX E

RAW SCORES OBTAINED BY TWENTY-ONE SCHOOLS ON ITEMS IN THE UNREFINED DIVERSIFICATION OF WORKFLOW INSTRUMENT

APPENDIX E

RAW SCORES OBTAINED BY TWENTY-ONE SCHOOLS ON ITEMS IN THE UNREFINED DIVERSIFICATION OF WORKFLOW INSTRUMENT

The raw scores for all schools on each item of the unrefined Diversification of Workflow instrument are shown in the following tables.

Items are referred to by number. Full descriptions of the items and the method of scoring them are given on pages 123-140 above and in Appendix A. Schools 1 to 6 are E.P.S.D. schools, schools 7 to 12 are E.S.S.D. schools, and schools 13 to 21 are W.R.C.C. schools.

THE UNREFINED DIVERSIFICATION OF WORKFLOW INSTRUMENT: RAW SCORES

	Item numbers																	
School	1	2	3	4	5	6	7	8	9	10	10a	11	12	13	14	15	16	17
1	5.4	49.5	870	8.1	1.8	9.0	2.8	3.8	17.9	14	0.17	2	1	5.8	3	2	0.0	3
2	4.9	42.6	414	4.3	1.3	6.2	1.9	1.1	10.1	10	0.13	2	1	7.0	3	2	1.5	2
3	5.6	42.6	576	7.4	0.8	9.3	2.3	3.8	8.3	10	0.05	2	1	6.1	3	2	0.0	3
4	7.3	50.9	1182	9.0	2.6	9.5	4.1	2.6	39.6	18	0.20	1	2	10.2	3	2	0.0	2
5	4.3	34.2	395	6.6	1.1	10.7	1.8	2.3	5.1	12	0.10	2	1	6.3	3	1	0.0	3
6	4.1	35.6	280	5.8	0.9	5.0	2.2	1.8	12.9	14	0.12	2	1	5.8	1	2	0.0	2
7	6.1	33.3	205	4.1	1.2	3.7	1.7	1.3	17.1	10	0.18	2	1	7.4	3	0	6.0	2
8	5.3	46.2	375	6.3	2.1	5.8	2.5	2.3	30.6	8	0.17	2	1	11.2	1	1	6.0	3
9	3.9	51.4	875	11.7	3.6	8.1	5.3	3.2	42.3	10	0.15	2	3	7.8	2	1	0.0	3
10	4.3	53.8	570	8.8	1.5	8.7	3.3	2.3	28.1	11	0.12	2	1	6.3	3	2	1.7	3
11	5.3	39.0	425	7.7	2.2	5.5	3.6	2.2	34.1	5	0.10	2	1	6.7	1	3	10.0	3
12	4.8	53.0	858	8.4	1.3	6.7	6.2	2.1	11.9	13	0.08	2	1	7.6	3	2	0.0	3
13	5.6	41.3	140	3.9	0.4	4.3	1.4	0.6	2.9	12	0.10	3	5	7.8	1	2	9.8	5
14	5.7	29.8	120	2.5	0.3	1.8	1.2	0.4	13.3	6	0.04	3	5	7.5	1	3	10.1	5
15	4.3	56.3	260	5.3	0.7	4.3	2.0	1.1	15.6	5	0.03	2	5	11.8	1	2	8.9	5
16	4.6	33.7	300	5.5	0.6	4.5	1.7	0.7	23.3	11	0.10	3	5	9.7	1	2	10.1	5
17	5.5	38.4	292	5.6	0.7	5.3	1.7	1.2	9.6	12	0.09	2	4	9.2	1	3	9.8	5
18	4.3	38.0	*	*	*	*	*	*	*	4	0.03	2	4	10.7	1	3	10.0	5
19	5.2	47.8	160	2.7	0.5	2.3	1.6	0.6	9.4	5	0.04	2	5	10.2	1	2	10.1	5
20	5.0	52.5	112	2.8	0.4	4.0	0.9	0.4	10.7	8	0.09	3	5	8.8	1	4	10.3	5
21	4.6	50.0	150	2.0	0.5	1.9	1.2	0.3	10.0	6	0.09	3	5	10.4	1	4	10.0	5

* Data not available.

THE UNREFINED DIVERSIFICATION OF WORKFLOW INSTRUMENT: RAW SCORES (Continued)

School	← Item numbers →																	
	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
1	3	3	5	5	5	2	3	2	2	2	3	3	4	1	4	4	4	3
2	2	2	4	4	4	2	3	2	2	2	3	3	4	1	4	5	4	2
3	2	3	5	5	5	2	3	1	2	4	3	3	4	1	4	6	4	3
4	3	3	5	5	5	2	3	2	3	4	3	3	4	1	4	4	4	3
5	2	3	5	4	3	2	3	2	2	4	3	3	4	1	4	3	4	3
6	3	3	4	3	4	1	2	1	2	1	3	3	4	1	4	3	4	3
7	3	3	4	4	3	2	2	2	2	4	3	3	4	1	4	4	4	3
8	3	3	4	4	4	2	3	2	2	4	3	3	4	1	4	3	3	2
9	3	3	3	3	3	2	3	2	3	4	3	3	4	1	4	2	4	3
10	3	3	4	4	5	2	2	2	2	4	3	3	4	1	4	4	3	3
11	3	3	4	4	4	3	2	2	1	3	3	2	1	0	4	3	3	2
12	3	3	4	4	4	2	3	2	2	4	3	3	4	1	4	5	3	2
13	3	3	5	2	2	3	1	3	2	4	3	2	1	1	4	5	4	4
14	3	3	3	2	3	3	1	3	1	4	3	3	3	1	3	5	2	4
15	3	3	4	4	2	3	1	3	4	4	3	3	1	1	4	5	4	3
16	3	3	2	3	3	3	1	3	4	4	1	1	1	1	4	5	4	2
17	3	3	3	2	2	3	1	2	2	4	3	2	2	1	3	5	3	3
18	1	3	1	2	2	3	1	3	2	4	3	2	1	0	3	5	2	2
19	3	3	1	3	4	3	1	3	2	4	1	1	1	0	1	5	3	3
20	2	1	2	2	3	3	1	2	2	4	3	2	1	1	4	5	2	2
21	1	3	2	4	3	3	1	3	2	4	1	1	1	0	4	5	4	3

THE UNREFINED DIVERSIFICATION OF WORKFLOW INSTRUMENT: RAW SCORES (Continued)

	← Item numbers →																
School	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	No. of teachers
1	1	2	0	0	2	1	2	0	1	2	1	3	1	2	1	1	79.6
2	1	1	0	0	1	1	2	0	2	2	1	2	1	3	1	1	54.0
3	1	1	0	2	0	2	4	0	2	2	1	3	1	2	1	1	116.5
4	1	2	0	0	1	2	5	1	1	2	1	2	1	3	1	1	76.0
5	1	2	0	0	0	1	2	0	2	2	1	3	1	3	1	1	73.5
6	1	2	0	1	1	1	1	0	2	2	1	2	1	3	1	1	78.0
7	1	1	0	3	3	0	1	1	2	2	1	2	1	3	1	1	33.0
8	1	0	0	0	2	1	1	1	2	2	1	3	1	3	1	4	35.5
9	1	2	0	1	4	2	1	0	2	1	1	3	1	2	2	4	48.0
10	1	2	0	0	0	2	5	0	2	2	2	3	1	3	1	1	75.0
11	1	1	0	2	1	2	1	0	2	2	1	3	1	3	1	4	39.0
12	1	0	0	2	1	1	1	0	2	1	1	3	1	3	1	1	111.0
13	1	1	1	4	4	3	5	1	2	3	2	5	2	4	3	5	92.0
14	1	2	1	4	4	3	4	1	2	3	2	5	2	5	3	4	89.0
15	1	0	1	4	0	3	5	1	2	3	1	5	2	6	3	4	88.6
16	1	0	0	3	2	3	5	1	2	5	2	5	2	5	3	4	102.0
17	1	0	1	3	4	3	5	1	2	3	1	5	2	5	3	5	100.0
18	1	0	0	3	1	3	5	1	2	4	1	5	2	5	3	4	78.5
19	1	0	1	4	2	3	4	1	2	1	2	5	2	5	3	5	70.0
20	1	0	0	3	4	3	4	0	2	3	1	5	2	4	3	4	64.0
21	1	0	1	2	0	3	4	1	2	3	1	5	2	5	3	4	57.0